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Electric Railway Journal

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Instructions for Use of Index

This index is essentially a subject index, not an index of titles, and articles treating a number of different subjects are indexed under each of them. In addition, a geographical reference is published wherever the article relates to any particular railway company, or to the State matters of any particular State. The geographical method of grouping serves to locate in the index any article descriptive of practices, conditions, events, etc., when the searcher knows the electric railway, city or State to which the article applies. Groupings are made under the name of the city in which the main office of the company is located, but an exception is made in the case of electrified sections of steam railroads, such entries being made direct under the name of the railroad. City or State affairs appear direct under the names of the city or State involved.

In the subject index, the alphabetical method is followed, and if there is a choice of two or three keywords the one most generally used has been selected, cross references being supplied. Below will be found a list of the common keywords used in the index to this volume. This list has been subdivided for convenience into sixteen general subjects, but the general subject headings, shown in capital letters, do not appear in the body of the index. As an example, if a reader wished to locate an article on power-driven tower wagons he would obviously look in the list under the general subject "vehicles," and of the two keywords that appear under this caption, only "Service and tower wagons" could apply to the article in question. The reader would therefore refer to this keyword under "S" in the body of the index.

In addition to the groups of articles covered by these headings the papers and reports from railway associations are grouped under the names of the various organizations. Proceedings of other societies are indexed only in accordance with the subject discussed. Short descriptions of machine tools appear only under the heading "Repair Shop Equipment" and are not indexed alphabetically, because of the wide choice in most cases of the proper keyword.

CLASSIFIED LIST OF KEYWORDS

CARS AND OTHER VEHICLES

Car design
Cars (descriptive)
Motor buses
Motor cars, gasoline
One-man cars
Work and wrecking cars

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Bearing metals
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Controllers
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Gears and pinions
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Trucks
Wheels

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Labor
Wages

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Power stations and equipment
Power station practice
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Special work
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Electric Railway Journal

H. W. BLAKE, *Editor*

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"No Excuse for Prevailing Pessimism"

"With Darkest Days Behind, the Electric Railway Industry Should Seize the Opportunity for Reconstruction Along Service-at-Cost Lines"

The above statement recently made by one of the great leaders in the electric railway industry is timely and constructive. "Faint Heart ne'er won fair lady." "Where there's a will there's a way." Let us all resolve to make the year 1919 a truly reconstructive year and place the Industry on the sound, thriving basis it so eminently deserves. The American public is constructive and fair minded when the majority know the facts. Let us all join and help place the facts before the public in their proper light.

The manufacturers are ready to do their part in the reconstruction program; in fact, they have been putting forth every effort toward producing apparatus that would effect economy. The Westinghouse Company was the first to develop and build the light-weight motors suitable for the safety-cars.

Westinghouse engineers were among the first to cooperate with the War Board in working out the skip stop which not only represents economy, but also provides faster and better service to the public.

Westinghouse engineers were leaders in gathering data, etc., on Electric Railway Freight Haulage, and had previously developed splendid slow-speed, field-control motors which enabled the railways to haul heavy tonnage with nominal sub-station capacity.

The results of this work are extremely gratifying, up to date. A large number of interurban and suburban lines are enjoying very satisfactory revenue from freight-haulage business with Baldwin-Westinghouse electric locomotives.

Constructive legislation, both State and National, is required, however, in order to make it possible for electric lines to serve their com-

munities to the fullest measure in the freight-haulage problem, due to the fact that the existing laws and regulations of the Interstate Commerce Commission, as applied to steam roads, are impossible for many of the electric railways, and should be modified.

Westinghouse engineers have devoted a great amount of time to the study of maintenance cost reduction, and have published a series of articles entitled, "Railway Operating Data" which give reliable and up-to-date information on maintenance and inspection methods which will improve service and reduce maintenance costs.

Westinghouse engineers have also published instructive and reliable information entitled—"Railway Engineering Data" which enables railway operating engineers to analyze the operating performance of their equipments, and to select gear ratios and adjust stops and schedules within the safe temperature capacity of motor equipments.

This information is also of value to the railway operating engineers in studying the great economies that are possible in retiring obsolete types of motors with light-weight Westinghouse motors.

In this connection, the Westinghouse Company has perfected and standardized a complete line of modern motors to accommodate the existing types of axles and wheel sizes, so that new up-to-date motors may be applied to old trucks that are still serviceable.

Experience, during the past years, has shown that multiple-unit operation for congested traffic is not only economical, but handles the crowds much better than single car operation. The Westinghouse "HL" control has been in successful operation for ten years, and during that period every detail has been perfected and improved, and today it is without a peer for reliability, simplicity and all-around satisfaction. Over two hundred roads have standardized on this type.

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.

Reliability

Three
30,000 kw.

Westinghouse Cross-Compound
Turbine-Generators

Three years of successful operation have demonstrated the reliability and the high efficiency of this design.

Westinghouse
Elec. & Mfg. Co.

East Pittsburgh
Penna.

WESTINGHOUSE ELECTRIC

Westinghouse

Elevated and Subway Service

The short headway, high speeds, also short stops and quick get-aways of elevated and subway rapid transit trains demand the use of the highest type of an air brake combining the efficiencies and refinements of the WESTINGHOUSE Electro - Pneumatic, Variable Load type. Send for Descriptive Catalogue T2018.

Brake Building our Business for a Lifetime.

Westinghouse Traction Brake Company

General Offices and Works, Wilmerding, Pa.

Atlanta, Ga.
Boston, Mass.
Chicago, Ill.
Columbus, O.

Denver, Col.
Houston, Tex.
Los Angeles, Cal.

TRADE
MARK

Mexico City
New York, N. Y.
Pittsburgh, Pa.

San Francisco
Seattle, Wash.
St. Louis, Mo.
St. Paul, Minn.

What the Safety Car is Doing at Beaumont, Texas

Population served 46,000

The "Light-Weight Car" made a "Safety-Car"

TWO years ago the Beaumont Traction Company installed seven light-weight cars and a year later another seven of the same type.

Of course it enjoyed the advantages of energy-saving due to light weight; and the public appreciated the new cars with their low steps.

But note that the company was quick to see that the only way to get the greatest possible mileage at least platform expense, while shortening the headways, too—

Was to use the thoroughgoing equipment of the light-weight car with the Air Brake and Safety Car Control Equipment furnished by this company.

Why wait when such results are possible?

SAFETY CAR DEVICES COMPANY

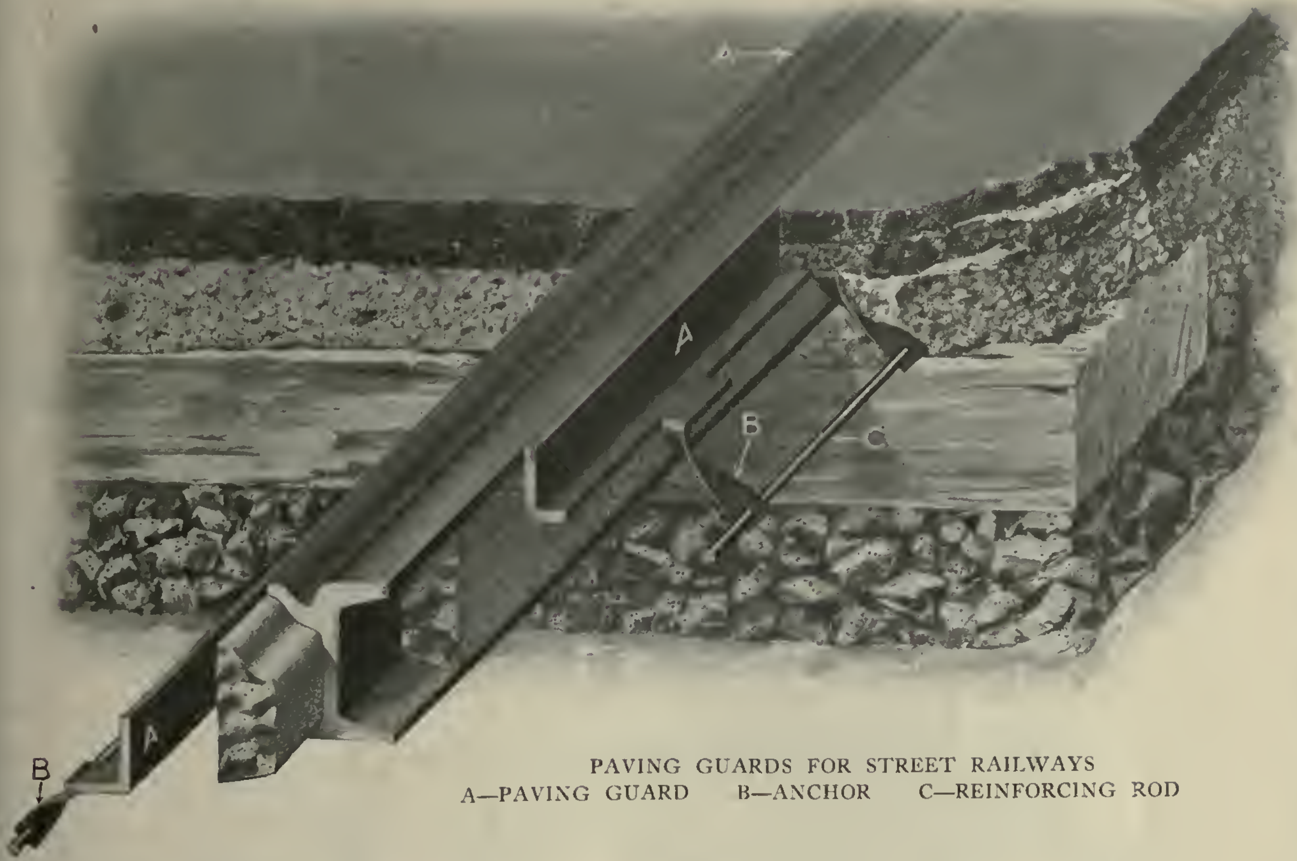
Main Office: Boatmen's Bank Bldg., St. Louis

CHICAGO
Railway Exchange Bldg.

NEW YORK
City Investment Bldg.

PITTSBURGH
Westinghouse Bldg.

CANADA—Canadian Westinghouse Co., Ltd., Hamilton, Ont.



PAVING GUARDS FOR STREET RAILWAYS
A—PAVING GUARD B—ANCHOR C—REINFORCING ROD

International Paving Guards Make Pavements Strongest Adjacent to the Rails

The International Paving Guard gets away from the "rigid" or unit idea of construction and allows the rails vertical play—while the adjacent paving is rendered strong and secure.

International Paving Guards bind together any kind of a paving surface with a concrete base—reinforcing rods and paving guards.

This makes not only rigid paving construction—but also one that is trouble proof—undisturbed by the heaviest traffic. Note the illustration carefully.

Any suitable foundation may be used under the ties—such as broken stone, soil, etc.

With Paving Guard protection—pavement does not break down into ruts beside the rails—does not heave and stands up under varying changes of climate.

In the same way that International Steel Twin Ties and Crossing Foundations eliminate track worries the International Paving Guards put an end to continuous and costly paving repairs.

The International Steel Tie Co.

Manufacturers of Steel Twin Ties and Steel Crossing Foundation
Cleveland, Ohio

City lines, interurban

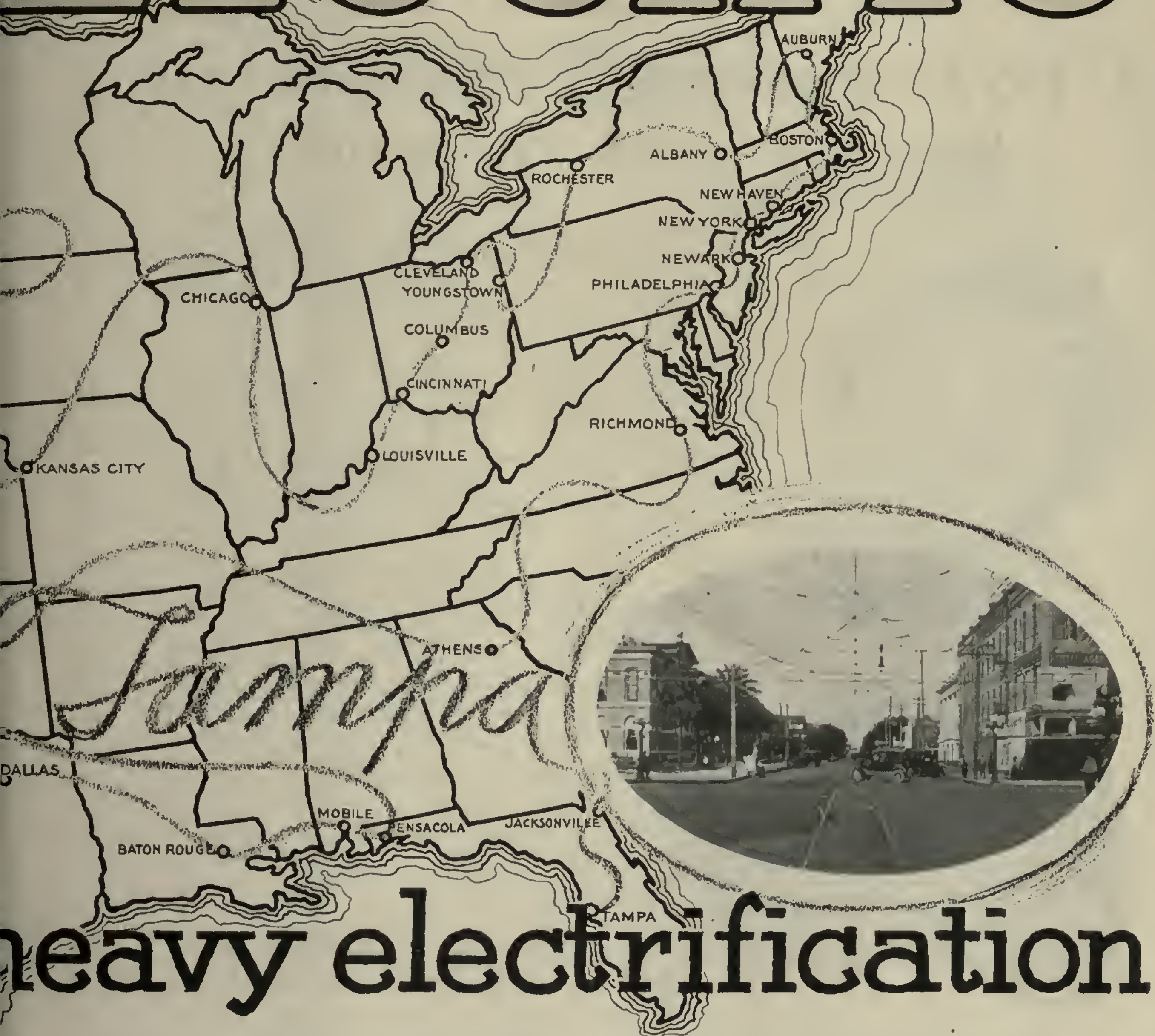
The electric railway properties of one of the large operating companies extend from coast to coast and range in size up to cities of nearly half a million population.

On almost all of these properties Phono-Electric Trolley Wire is standard for the places where trolley wire is subjected to eccentric wear or for lines of concentrated traffic.

At Tampa, Florida, for example, where traffic is comparatively light, Phono-Electric is used for

BRIDGEPORT BRASS COM

Electric



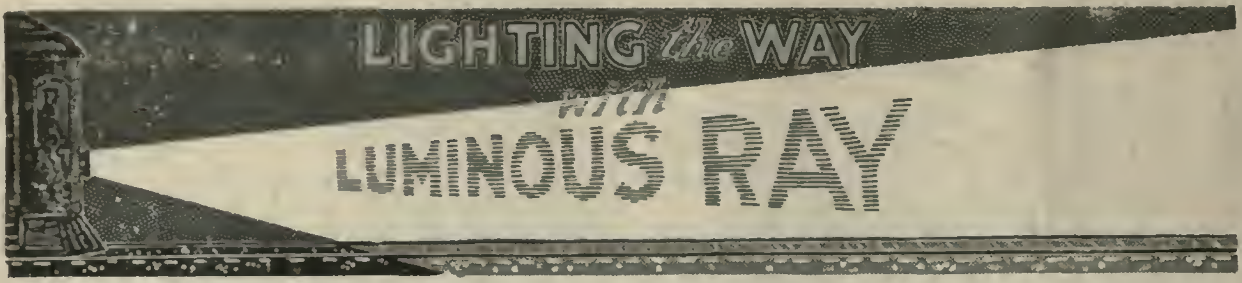
eavy electrification

such special work as curves, to assure permanently good alignment and minimize de-wirements of the trolley wheel.

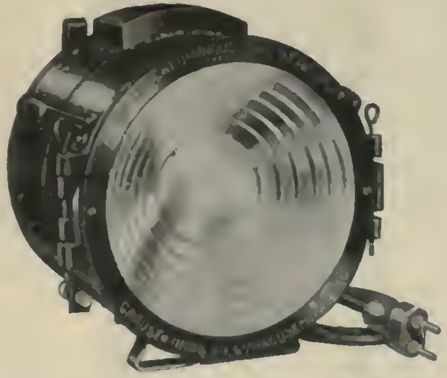
Again, in the larger city of Tacoma, Washington, Phono-Electric Trolley Wire is the standard for both tangent and curved tracks in the entire downtown district.

That installations such as these are being added to from year to year is another proof of the adaptability of Phono-Electric Trolley Wire because it makes good in every character of service.

PANY, BRIDGEPORT, CONN.



A Powerful Safe Light on Low Voltage with Imperials



Type LAA—Luminous Arc and Incandescent. (Incandescent lamps are used when running through lighted streets of cities or villages.)

Type LAA—Rear door open showing mechanism mounted on air-tight partition.

Even when the voltage is abnormally low Imperial Luminous Arc Headlights project a brilliant penetrating beam. And such a beam is essential to safe operation through the country at night.

Imperials demand little care. They are simple. They are rugged.

The two-compartment case—an exclusive feature—has two functions. The air-tight partition—

First, serves to protect the mechanism in the back from the fumes and deposits of the electrodes in the front.

Second, reinforces the already sturdy case.

There are many types of Crouse-Hinds Imperial Luminous Arc, Carbon Arc and Incandescent Headlight. Ask for a demonstration of any of them.

THE OHIO BRASS COMPANY, Mansfield, Ohio

New York Philadelphia Pittsburgh Chicago Los Angeles San Francisco

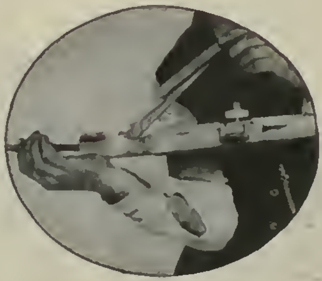
General Sales Agents in the United States for Crouse-Hinds Imperial Headlights

O-B PRODUCTS

Quality First

O-B Type E Frog, adapted for high speed service and for use where several types of cars are operated over same line.—Patented

O-B Type D Frog, suitable for moderate speeds and all general city service.—Patented



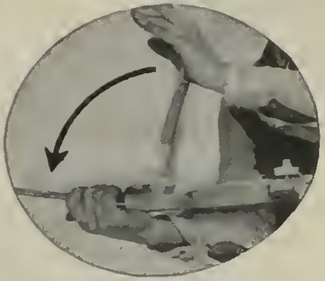
Slip tip under hooks—

Here Is Speed and Labor Saving in O-B Trolley Frogs

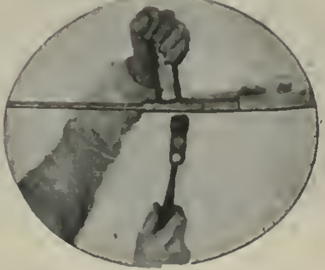
Installation of O-B Frogs is exceedingly simple. The trolley wires are gripped in a single powerful clamp. The Cam Tips are put on as shown in the illustrations at the right. That's all there is to do.

The Cam Tips absorb the first shock of the wheel and provide a smooth passage from wire to pan. They take the brunt of the wear and may be renewed easily.

Send for "Saving Time on the Line."



turn over and down on the wire—



clinch the lips and the job is done.

The Ohio Brass Company

Mansfield, Ohio

New York City Philadelphia Pittsburgh Chicago San Francisco Los Angeles

ESSCO Special on the Birney

KEYSTONE TROLLEY CATCHERS

"They keep the operator on the car."

"GOLDEN GLOW" HEADLIGHTS

"As easy to maintain as they are efficient in illumination."

FARADAY HIGH VOLTAGE SIGNAL SYSTEM

"A pleasure for the passenger as well as the car maintainer."

KEYSTONE ILLUMINATED DESTINATION SIGNS

"By their signs ye shall know them for real sellers of transportation."

KEYSTONE AIR SANDERS

"The able little brother of the airbrake."

KEYSTONE ROTARY GONGS

"Clear the track for speedy and safe car operation."

Here are the specialties that have helped to put the Safety Car across.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA	PITTSBURGH	NEW YORK	CHICAGO
17th and Cambria Streets	337 Oliver Building	50 Church Street	Monadnock Building

ties Are Standard Safety Car

THE Birney one-man Safety Car has been called the Ford of the electric railway industry.

At any rate it is certainly the first STANDARD car of the electric railway industry.

We are not proud merely of the fact that Essco specialties have already gone on or been specified for practically every Birney Safety Car.

We are prouder of the fact that these specialties have made good under the diversity of conditions for which these cars have proven adapted. All the more so because these cars are running faster, working harder and carrying more passengers than their pleased owners ever anticipated.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA	PITTSBURGH	NEW YORK	CHICAGO
17th and Cambria Streets	337 Oliver Building	50 Church Street	Monadnock Building

SAND; Real, Dry Sand the product of this famous Keystone Drier

Keystone Sand Drier

Simply a cast-iron heater surrounded by a sheet-iron hopper, which rests on a perforated ring. Wet sand is shoveled into the hopper against the heater, and as it dries runs out through the perforated ring at the bottom.

It dries the sand quickly and cheaply; uses no steam coils; is made to burn any kind of fuel; may be located and operated anywhere.

Real dry sand from these Keystone Driers will solve your sand problems.

Write for special booklet

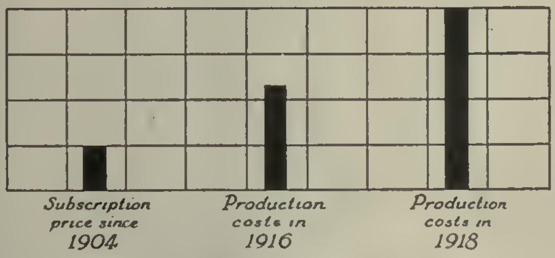
ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA 17th and Cambria Streets
PITTSBURGH 337 Oliver Building
NEW YORK 50 Church Street
CHICAGO Monadnock Building

The Subscription Price of the *Electric Railway Journal* is to be Increased to Four Dollars

It is a necessity forced upon us by the same economic and business conditions that are back of the move for higher fares—namely, the cost of producing service is out of all proportion to the money received for it. Paper — ink -- engravings — brains — labor — postage — everything that enters into the making of a great modern technical journal—have been continually mounting in costs. And the end is not in sight.



These lines tell the story

So the price is to go to four dollars

The new price might well have been made five dollars, in conformity with the price of most technical papers. Not merely because it costs $5—and much more—to produce it, but also because Electric Railway Journal's service fully measures up to the $5 quality. We made the new price four dollars, as we realized that the men whom we serve have not had prosperous times lately.

In meeting these conditions

there is only one alternative. We might curtail the quantity and quality of the service. But that is unthinkable. This is a time when the industry must go forward—when all who serve it must give of their very best. A time when the men of the industry need the highest type of journalistic service—the kind they have been accustomed to find in the Electric Railway Journal.

The four dollar moment will come soon

But before it comes, we give you the opportunity of postponing its force for a whole year. If you are not now a subscriber, quick action will get you on our list at the present $3 rate. If you are a subscriber, you may renew for a year beyond the expiration of your present subscription at the present $3 rate.

Don't delay

Save the dollar—fill in, tear off and mail the coupon below

Today

TODAY it is $3.
(In Canada, $4.50; foreign, $6)

SOON it will be $4.
(In Canada, $5.50; foreign, $7)

Take a leaf out of time—
Put a dollar in your pocket—

By ACTING QUICKLY

TEAR OFF HERE

McGraw-Hill Co., Inc., 10th Ave. at 36th St., New York.

Enter my subscription for one year to Electric Railway Journal. I will remit $3 in 30 days. It is my understanding that this request will not be accepted if mailed after the new price goes into effect.

If you are now a subscriber, check here__________.
Your subscription will be extended for one year beyond its present expiration date.

*Name*______________________________________

*Street*______________________________________

*City*____________________*State*__________________

*Company*__________________*Position*__________________

MAIL THIS COUPON TODAY

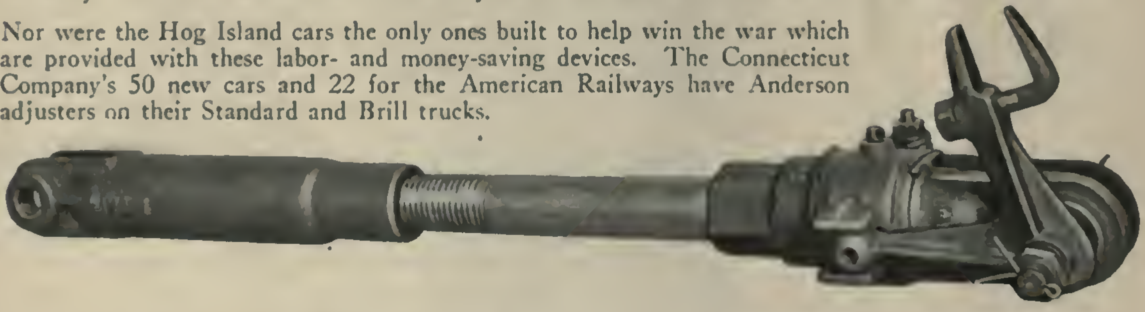
AD

Anderson Slack Adjusters Selected for New Cars of Emergency Fleet Corporation

HOG ISLAND shipyard cars are not withdrawn from service for brake adjustments. Their designers knew that these cars would be far too busy for that and they eliminated the necessity for all manual brake adjustment.

Because Anderson adjusters can be depended upon to take up all true slackness they were chosen for 240 new cars. Their performance at Philadelphia and on many other lines showed their reliability under all weather conditions.

Nor were the Hog Island cars the only ones built to help win the war which are provided with these labor- and money-saving devices. The Connecticut Company's 50 new cars and 22 for the American Railways have Anderson adjusters on their Standard and Brill trucks.



This type of Anderson Adjuster for BEAMLESS Trucks

What These Adjusters Accomplish

They enable a railway to remove one man per each 40 cars from setting brakes to do other useful work.

They make all car brakes alike and decrease collisions—reference to report sheets show the number of accidents due to slack brakes.

They save power by preventing dragging shoes. They maintain proper and constant clearance through the life of the shoe. Piston travel always remains the same irrespective of shoe and wheel wear, reducing compressor operation.

Anderson adjusters take the place of ordinary turnbuckles and can be installed on almost any truck in 30 minutes. They require no attention and are not affected by mud or ice. Moreover, they are not actuated by false slackness nor by worn pins, holes or journals.

Test Offer—We will place a test set of adjusters on any railway on request.
Send for data sheet and other information.

Holden & White Inc.

817 Fisher Building, Chicago, Ill.

National Railway Appliance Co., New York and Washington; Wray P. White, Houston, Texas; C. E. A. Carr Co., Toronto;
W. M. McClintock, St. Paul; Alfred Connor, Denver; F. F. Bodler, San Francisco
S. I. Wallies, Los Angeles; L. Brandenburger, Salt Lake City.

STYLE "N" COLOR LIGHT SIGNALS

UNION equipment will solve your interurban traffic problems. Let us study your operating conditions and cooperate with you in considering what *automatic block signaling* will do for *your line.*

Trade US&S Mark **Union Switch & Signal Co.** Trade US&S Mark

SWISSVALE, PA.

Aluminum Company
of America

Manufacturers of

ALUMINUM

Electrical Conductors

All-Aluminum and Steel Reinforced

for

Transmission Lines
Railway and Industrial Feeders
Signal Circuits
Railway Catenary Construction
Bus Bars

also

Ingots—Rods—Rivets—Extended Shapes
Sheet Tubing

also

Aluminum Solders and Flux
Flux and Wire for Autogenous Welding

GENERAL SALES OFFICE
Oliver Bldg., Pittsburgh, Pa., U. S. A.

Canada:
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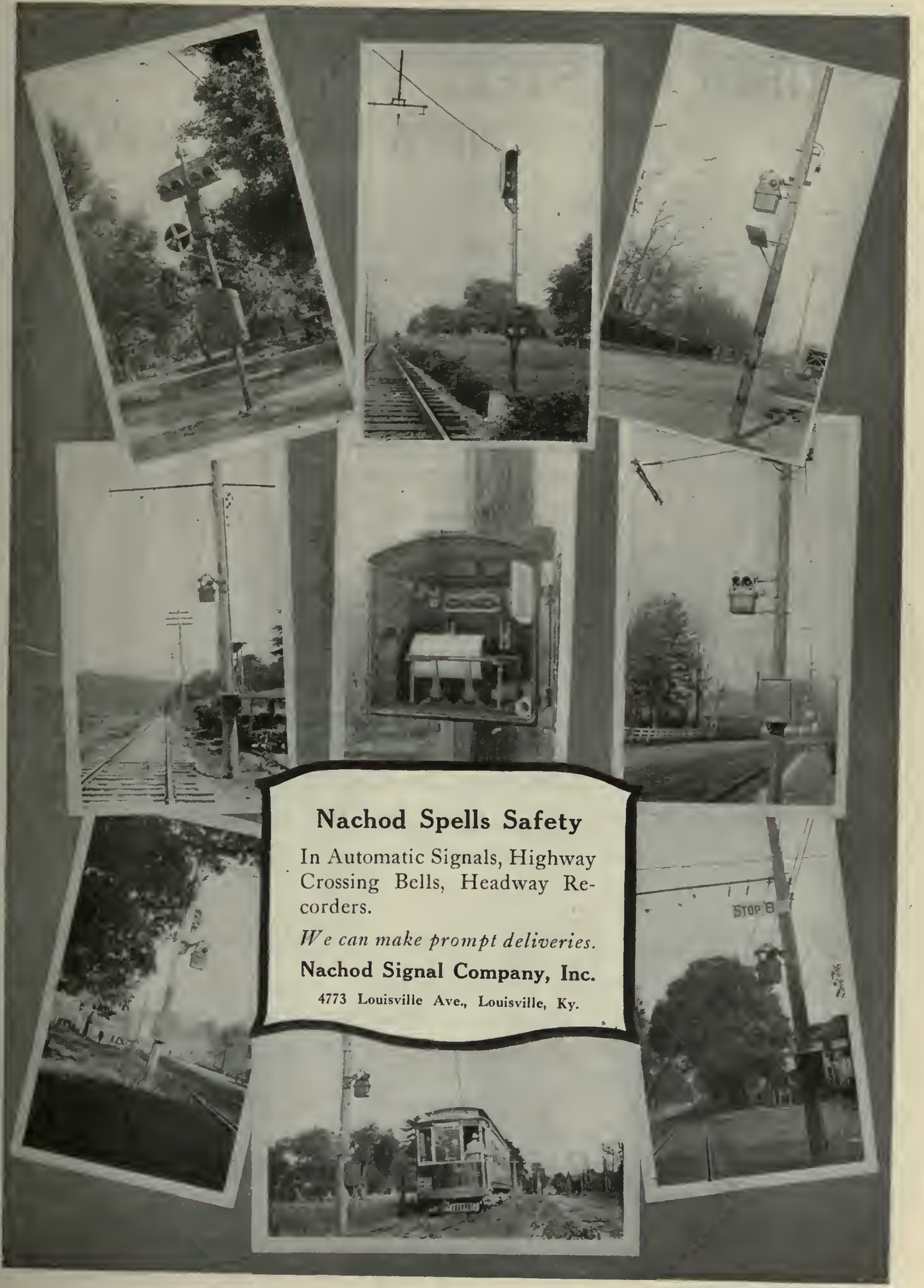
Northern Aluminium Co., Ltd., London



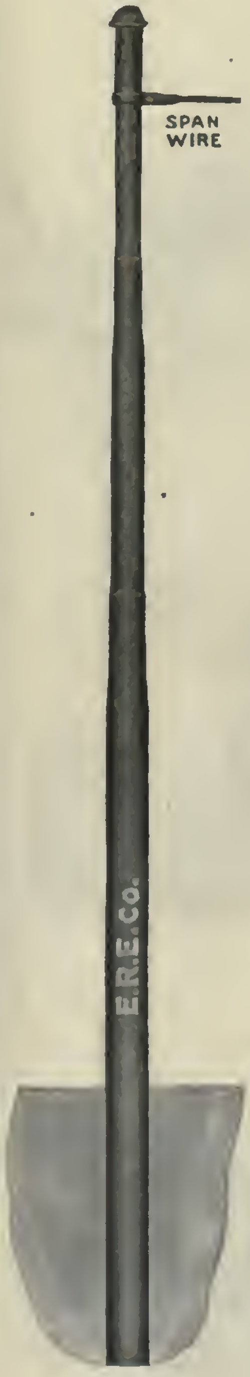
Nachod Spells Safety

In Automatic Signals, Highway Crossing Bells, Headway Recorders.

We can make prompt deliveries.

Nachod Signal Company, Inc.
4773 Louisville Ave., Louisville, Ky.

TUBULAR STEEL POLES NOW AVAILABLE

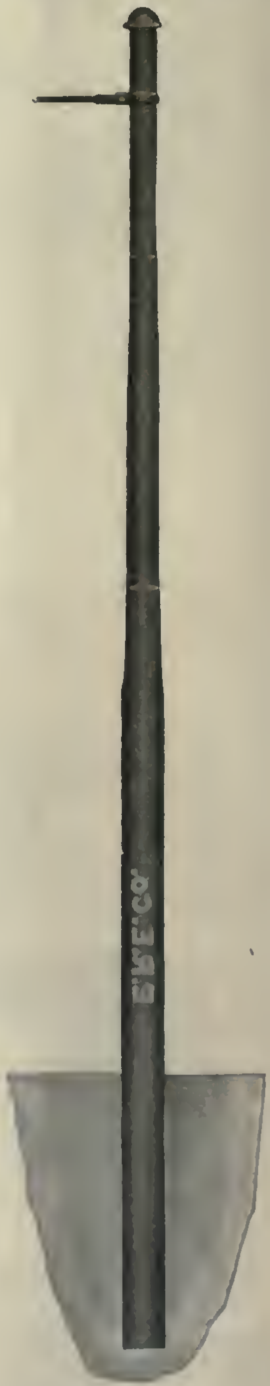


During the war period the supply of steel for the manufacture of Tubular Poles was seriously curtailed.

We are now assured that the usual pre-war tonnage is available and it is with pleasure we announce that all orders for "ELRECO" Tubular Steel Poles can be handled promptly.

Inquiries received for Tubular Steel Poles since the signing of the armistice clearly indicate that not only future line construction is now being given careful consideration, but also that "permanent construction" is to be the watchword.

Hundreds of thousands "ELRECO" Tubular Steel Poles are in use for street railway and combination rail-light purposes in all parts of the country. They have made good at all times as the best poles, against every other form, style and shape of pole conceivable.



Electric Railway Equipment Co.
Cincinnati, Ohio
New York: 30 Church Street

Where ARMCO IRON WELDING RODS are given a critical test

This picture shows how the K-G Welding Co. of New York utilizes ARMCO IRON filler rods in welding outlet tubes onto dished heads. After completion, the welds are subjected to 600 pounds hydrostatic pressure for half an hour and under this test the welds must be free from leakage.

We are advised by the K-G Co., who are making 10,000 of these heads, that ARMCO IRON is doing its work in a very satisfactory manner.

ARMCO IRON filler rods are the logical choice for oxy-acetylene or electric welding for many reasons. The uniform purity and metal structure assure a smooth even flow and thorough strength uniformity of the properly executed weld. This strength can be made consistent with any requirements by judicious thickness and location of the deposited metal.

Remember too that by making *a single composition* in *two tempers* to do well what has heretofore required a choice of one from many grades, ARMCO IRON welding rods effect big economies in the amount of stock that must be carried by a welding shop, and greatly simplify the whole scheme of welding.

Carried in stock by conveniently located representatives in all large industrial centers.

PAGE STEEL & WIRE CO.

Established 1883 as Page Woven Wire Fence Co.

Makers of "Copperweld" Copper Clad Steel Wire; ARMCO IRON Welding Rods and Electrical Wire; Wire Mill Products, Plain and Galvanized; Wire of Special Analysis; Wire Fencing for all Purposes; Factory Gates; Ornamental Iron Fence; Machine Guards; Tool and Stockroom Partitions; Architectural Iron.

Plants: Monessen, Pa., and Adrian, Mich.

Sales Offices: 30 Church Street, New York

Western Representatives: Steel Sales Corporation, Chicago

ee

The trade mark ARMCO carries the assurance that iron bearing that mark is manufactured by the American Rolling Mill Company with the skill, intelligence and fidelity associated with its products, and hence can be depended upon to possess in the highest degree the merit claimed for it.

SAMSON

SPLICERS

They stay up.
Non-arcing.
No hard spots in trolley.
Stronger than wire.
Cost least per car mile.
Easy to install.

For "Service Efficiency" in any overhead material specify "Drew." Catalog for reference sent free on request. Ask for it.

DREW ELECTRIC & MFG. CO.
1016 E. Michigan St., Indianapolis, Ind.

District Representatives:
Holden & White, Inc., 313 S. Dearborn St., Chicago, Ill. Brown & Hall Supply Co., 1515 Pine St., St. Louis, Mo. Railroad Signal Supply Co., Hackney Bldg., St. Paul, Minn. Wm. F. McKinney, 54 First St., Portland, Ore. Frank F. Bodler, 903 Monadnock Bldg., San Francisco, Cal. Engineering & General Supply Co., 400 San Fernando Bldg., Los Angeles, Cal. Alfred Connor, Majestic Bldg., Denver, Colo. Wm. M. Lawyee, 383 Fayette St., Syracuse, N. Y. Goldschmidt & Forbes, Inc., 90 West St., New York, N. Y. H. S Salt (Export Agent), 114 Liberty St., New York, N. Y.

Canadian Representatives:
Northern Electric Co., Ltd., 121 Shearer St., Montreal, Quebec.

DREW
MEANS "SERVICE EFFICIENCY"

"ARMCO" IRON CULVERTS

REQUIRE neither skilled labor nor heavy tackle for their installation—ordinary labor, pick and shovel, are all you need.

TWO OR THREE LABORERS can handle and install a long length of "Armco" Iron Culvert, and the ditch is often opened, the culvert placed and covered, and traffic resumed the same day.

Best of all, *your culvert troubles are over* when you install "Armco." You'll find "Armco" Iron Culverts in all parts of the country, as serviceable today as when they were first put into the ground. Indisputable evidence of their unequaled rust-resisting and enduring qualities will be gladly sent you on request.

AMERICAN
ARMCO
INGOT IRON

For interesting data on "Armco" Iron Culverts, Flumes, Tanks, Signs, Sheets, Roofing and Formed Products, address

Armco Iron Culvert & Flume Mfrs. Assn.
Transportation Bldg., Chicago

You Can Not Reduce Power

Motorman's Co

It behooves you to hooverize your motormen.

There are many different methods of checking and recording the degree of efficiency with which a car is operated.

Any one of them is valuable *if the motorman tries to make a good record* under the method used.

None of them is valuable if the motorman does not try to improve operating efficiency.

Now, whether a man is a motorman, a blacksmith or a salesman, if you tell him you are going to check up the quality of his

Arthur Power-Saving

The motorman understands it — therefore has confidence in

He may not know a kilowatt-hour from a boot-jack, or a coasting percentage from the Rule of Three. **But he does know what a minute is.** He does know that the Arthur Recorder registers one minute for every minute he keeps power on his car. He does know that the fewer minutes he keeps power on the better his record is, and the better it shows on the instrument.

He can see that so long as he has the power on the Recorder keeps running, and that when he shuts power off the Recorder stops.

He soon learns that he can keep his power on time record low only by careful, intelligent handling of his job in every particular.

The whole thing is as plain to him as the face of his own watch.

"I am making my run now with 12 minutes power on time," says Motorman 93.

THE ARTHUR POWER

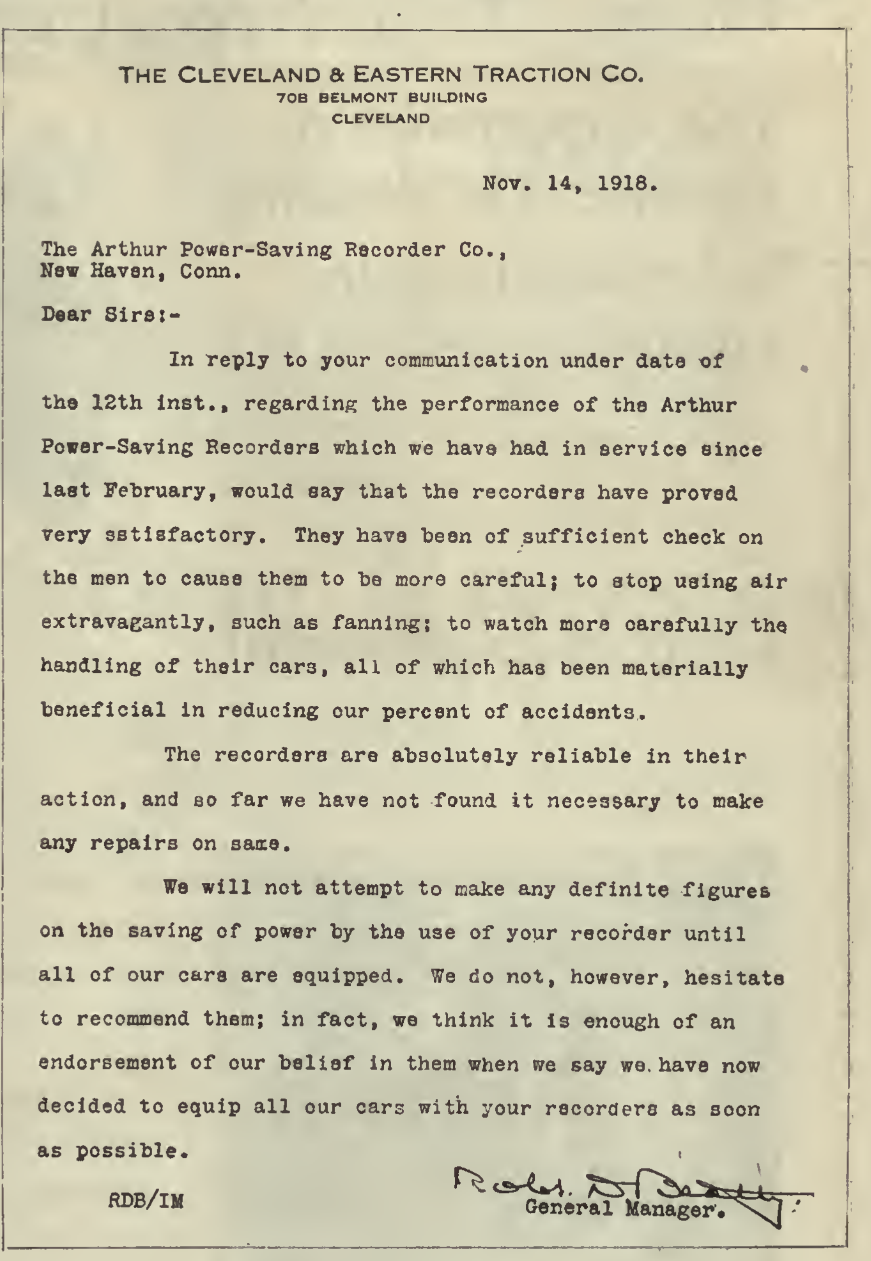
Second National Ban

Consumption Without Your

operation

work he wants to know first whether your method of checking is going to give him a "square deal."

He is going to be relatively confident or suspicious according to how clearly he understands just how your method of measuring works. Right there is one of the big reasons for the success that has attended the use of the



THE CLEVELAND & EASTERN TRACTION CO.
708 BELMONT BUILDING
CLEVELAND

Nov. 14, 1918.

The Arthur Power-Saving Recorder Co.,
New Haven, Conn.

Dear Sirs:-

In reply to your communication under date of the 12th inst., regarding the performance of the Arthur Power-Saving Recorders which we have had in service since last February, would say that the recorders have proved very satisfactory. They have been of sufficient check on the men to cause them to be more careful; to stop using air extravagantly, such as fanning; to watch more carefully the handling of their cars, all of which has been materially beneficial in reducing our percent of accidents.

The recorders are absolutely reliable in their action, and so far we have not found it necessary to make any repairs on same.

We will not attempt to make any definite figures on the saving of power by the use of your recorder until all of our cars are equipped. We do not, however, hesitate to recommend them; in fact, we think it is enough of an endorsement of our belief in them when we say we have now decided to equip all our cars with your recorders as soon as possible.

RDB/IM

General Manager.

Recorder

its record of his work

"Do ye, indeed? Well, maybe it will interest you to know I made that same run with 11 minutes power on," says No. 46.

And they both understand that this simple record in minutes fixes their individual status as workmen.

They *know* the record gives them a square deal because it is expressed in terms they understand—*minutes.*

All men have most faith and co-operate best in those processes and methods which they best understand.

The Arthur Recorder will help you to get from your men the kind of co-operation that brings down costs.

SAVING RECORDER CO.

Building, New Haven, Conn.

Have You Investigated?

The importance of Electric Arc Welding is becoming more apparent each day

Every Maintenance of Way Engineer should look into the possibilities of its application to his problems.

Lincoln Dynamotor—Type W

Lincoln Equipment

is especially designed for Electric Railway work. Highly efficient, small, light and portable. With it you can weld your joints, repair your special work and build up your cupped rails. You can roll the equipment into the shop for all manner of repairs to rolling stock. It will do everything that a big stationary outfit will do.

Further, you can acquire Lincoln equipment without any charges against capital account. Rent it on a basis that pays for the equipment out of the savings in the maintenance account.

At Work in the Shop.

Let us tell you more about it.

THE LINCOLN BONDING COMPANY

636 Huron Road, Cleveland, Ohio

Agents: Boston, Charles N. Wood Co. New York, Atlantic Welding Co. Philadelphia, Railway Track-work Co. Pittsburgh, Electrical Engineering & Manufacturing Co. Chicago, Holden & White, Inc. St. Louis, W. L. Ross Equip. Co. Milwaukee, W. C. Burdick. Los Angeles, Wigmore Hall & Co. Chattanooga, Tenn., Chattanooga Armature Works. Canada, Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg

Use Trains Equipped with National Pneumatic Door and Step Control

For Relief from Congestion

The surface car train of today is found in various combinations such as end-entrance motor and near-entrance trailer; end-entrance for both motor and trailer; end-entrance motor and center-entrance trailer; center-entrance for both motor and trailer; motor car with motorless trailer; motor car with two-motor trailer; trains with or without multiple-unit connections.

But no matter what combination you select, you will find that its speed and safety in getting over the line will be gently improved by installing

National Pneumatic Door and Step Control for quick, positive and laborless operation of doors and steps.

National Pneumatic Interlocking Safety Door Control for absolute safety to alighting and entering passengers.

National Pneumatic Motormen's Light Signals to eliminate waste of time with bell-cord signals.

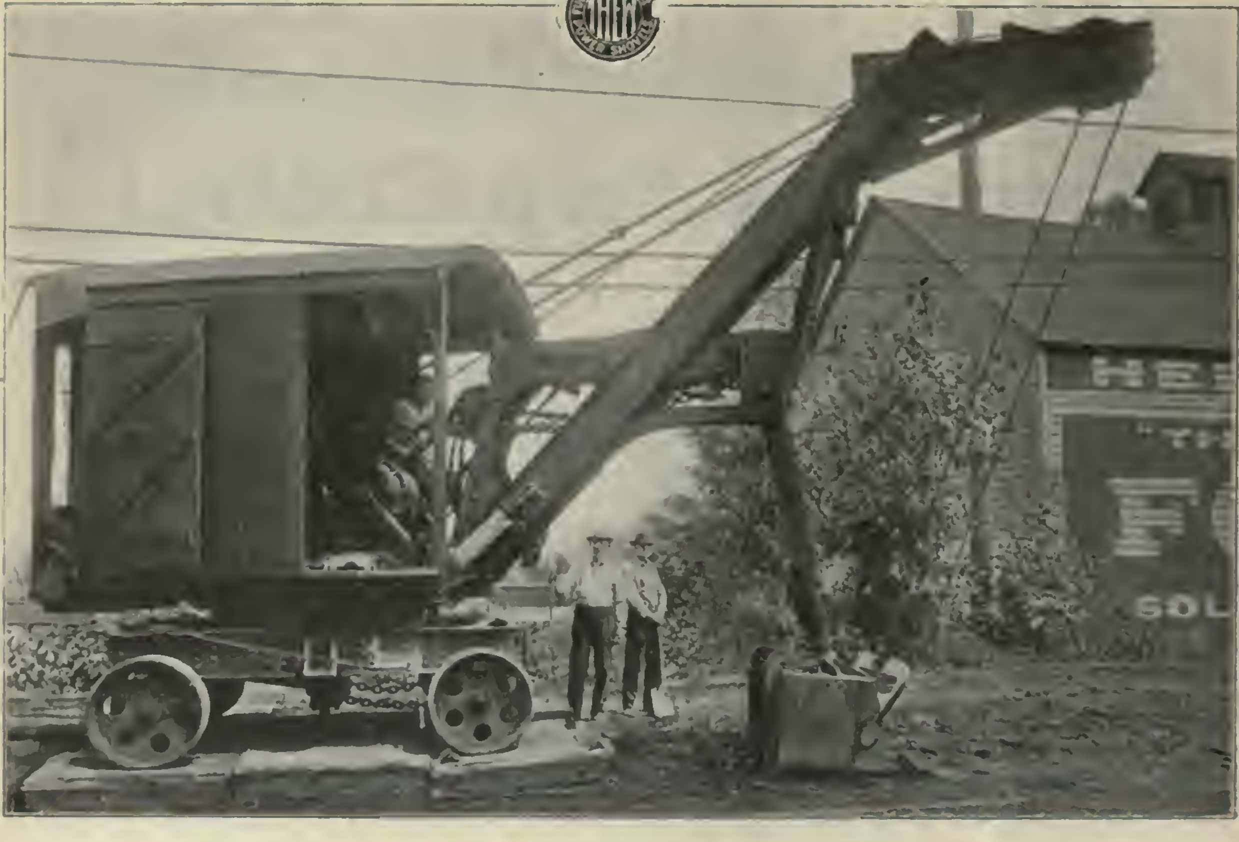
Montreal, Philadelphia, Detroit, Cleveland are a few of the train operators using one or more of these National Pneumatic traffic accelerators. We shall be glad to meet your requirements, too.

NATIONAL PNEUMATIC COMPANY
INC.

50 Church St. New York

515 Laflin St. Chicago

Thews are Everywhere



Three-Inch Grading in Hard Material

One of the reasons why the Minneapolis Street Railway Company finds Thew Electric Shovels advantageous and profitable is vividly illustrated.

This Thew is stripping 2 to 3 inches from a hard, packed street, preparatory to re-laying with car tracks.

No shovel except a Thew with its exclusive Horizontal Crowding Motion will remove so thin a scale.

In 19-inch grading on a 19-foot street, it averages 300 to 325 lineal feet daily.

No Repair Cost in Two Years' Service

Think of it! Used steadily for two years, in variable kinds of digging and loading, this shovel cost nothing for upkeep.

Continuing only during actual digging, current consumption is small.

Thew Electric Railway Shovels (with either car or traction wheels) will solve your maintenance and extension problems. Use them for track trenching; grading and filling; tearing up track ballast, old rails and ties; loading coal from stock-piles; and removing snow from tracks or streets.

They do the work of 25 to 30 men—for one-fourth the cost. No coal or water outfits needed.

Ask for Electric Railway Shovel Bulletin giving detailed cost and performance data.

Manufacturers of six sizes—sixty combinations of power shovels, built of Thew Standard Machinery Units, equipped with Combination Boom, Shipper Shaft or Horizontal Crowd—Steam, Gasoline, Electric.

THE THEW AUTOMATIC SHOVEL COMPANY
General Sales Office and Factory: LORAIN, OHIO
NEW YORK OFFICE: 30 Church St.

THEW Power Shovels

Export Department
ALLIED ALLIED CONSTRUCTION MACHINERY CORPORATION ALLIED
120 Broadway New York U.S.A.

In Service

on the South Shore Lines. Cars equipped with economical, wear-resisting wheels.

Davis One-Wear Steel Wheels

for freight or passenger cars. The assurance of high mileage and safety is branded deep into every Davis Steel Wheel.

American Steel Foundries
1100 McCormick Building, Chicago

ASF

Testimony in hearing before Commission, November 20, 1918

Question: Now, let us take up those meters, while you are on that. Will you explain what they are and what they do, and how you purchased them?

Answer: The meters are merely watt-hour meters with an exposed dial as in any meter, with a train of gears so as to read the kilowatt-hours. They are mounted in the vestibule of each car, and connected to the power circuit so that a registration is made of all the current consumed in kilowatt-hours. Every operating car is equipped with one of these meters and they are of different capacity. They range from 50 to 300 amperes.

Question: It is practically the same kind of meter that I have in my house, to measure the current, isn't it?

Economy Meter in Service on Bay State Street Railway

Answer: Yes, but not as delicate an instrument. It is designed for much more rugged use, as in the case of bumping around in street cars.

Question: That shows the current that the motorman would use on a given trip?

Answer: Yes, it represents power used in kilowatt-hours without any correction factor as in the house meter.

Question: How does that show the efficiency of the motorman? Are there not factors for which he would not be responsible at all which would increase the power consumed?

Answer: The use of the meter has two important advantages. One, it enables the motorman from his knowledge of a given route, knowing his distance and having been told in advance the standard or fair allowance for current on that line, to use that as his guide, and if he can operate his car with less current he has made a saving. If he exceeds the standard, of course he has been extravagant. That is a simple proposition. We put the question up to the employees, and they selected this type of measuring device. On the other hand, if the car consistently and per-

Economy Electric

L. E. GOULD,

Exclusive Sales Agent: ***Sangamo Economy***

New York Office:

Wetmore-Savage Co., Boston, Mass. Burton R. Stare Co., Seattle, Wash.
L. A. Nott, San Francisco, Calif.

Massachusetts Public Service in Bay State Zone Rate Case

sistently uses more than the standard amount of current and the motorman operates has car in what he believes to be an economical fashion in acceleration and deceleration, it is immediate evidence from the car turned in that the car has some motor defect. And the rule is that whenever the daily card is turned in showing a daily consumption more than the average, the car is looked over to see if the motor is out of order or some defect in the equipment. So that we use it really for three purposes: one, to give the motorman a guide as to how much current to use, whether he is extravagant or not, and then we post that record so as to put the men in competition; second, it guides the mechanical department very considerably in detecting defects; and third, for car inspection purposes we obtain the car mileage record in that way at a lessened expense over that heretofore, to the extent of some 11 or 12 clerks.

Question: You say that you are saving how much through the use of these meters?

Answer: At the rate the saving is now running, on the north of Boston, and in the Quincy district, it is slightly over $100,000 worth of coal per annum at the present price of coal, $9.80.

Question: How do you prove that you are saving that amount?

Answer: Because every car for a substantial period of time has been operated by experts over different routes and the route over which it usually runs, repeatedly, so as to obtain an average current consumption. From that is derived a standard fair current consumption for ideal or maximum acceleration and deceleration, and that is the bogie for which the men are contending. If they get under that standard it is a saving. We are now about 7 per cent. under that standard . . .

Question: How did you purchase them (the meters)?

Answer: They were purchased under a contract where they were paid in part—I think we paid 20 per cent. in cash and the balance in Receiver's certificates.

Question: How much did they cost?

Answer: The total cost of the meters was $57,000. There were 1239 of them. The men have cooperated in the saving of power with the use of these meters. They have responded splendidly to the instructions given, as to the acceleration and deceleration of the cars.

Type of Economy Meter Used on Bay State Street Railway

evices Company

resident

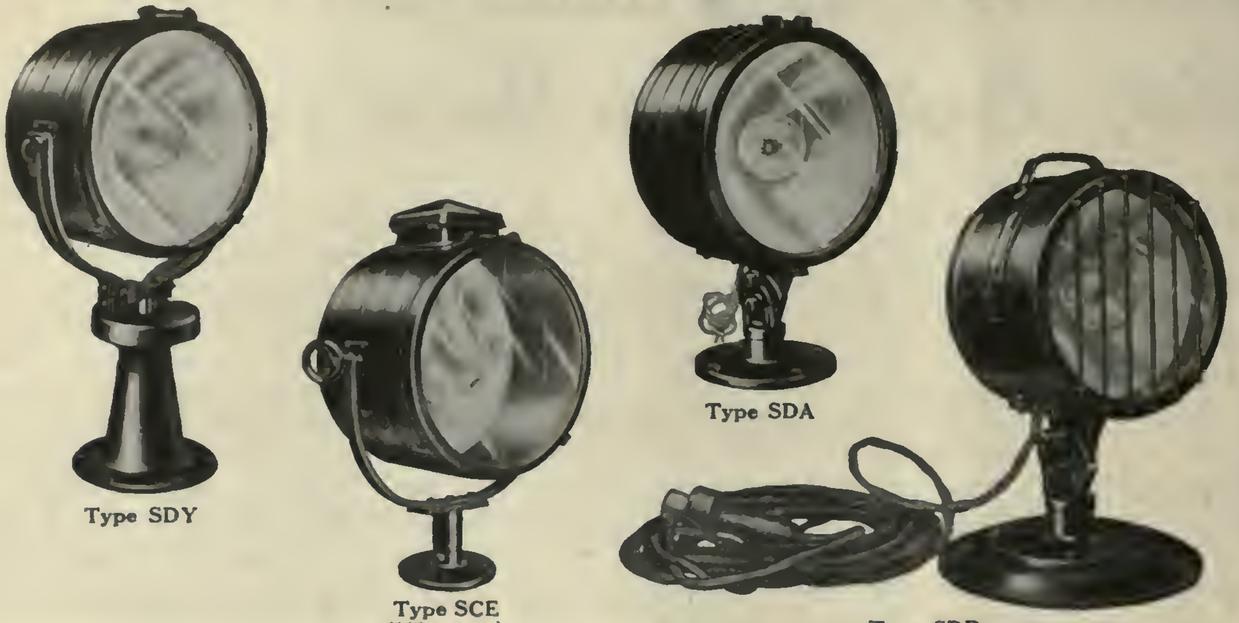
ailway Meter, Old Colony Bldg., Chicago

Church St.

dwig Hommel & Co., Pittsburgh, Pa. Rumsey Electric Co., Philadelphia, Pa.

G. Monahan, Los Angeles, Calif.

Imperial Flood Light Projectors



Type SDY

Type SCE
(100 watts)

Type SDA

Type SDR

Protecting Bridges

Guarding Tracks, Freight Yards, Round Houses—On 24 hours-a-day rush jobs—Speeding up night construction work to daytime output—

**Wherever Night has to be turned into Day
Imperial Flood Light Projectors are found**

They solve both the working-at-night and the protecting-at-night problems.

Their strong, steady beam is directed, spread or contracted by the simplest movements. They are made in many distinct types and take flood-lighting Mazda lamps up to 1000 watts, 105-130 volts.

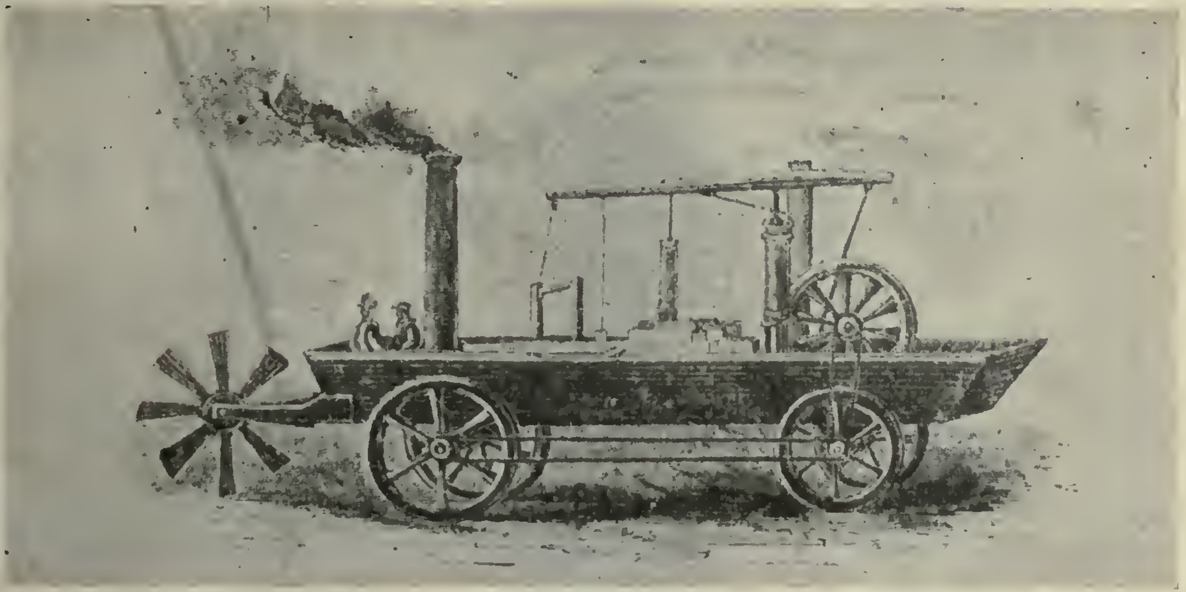
Imperial projectors are of rugged build. Their casing of rust-proof material makes them thoroughly weatherproof and insures years of service. Adequate ventilation is also provided for.

Our many years' experience is at your service. Tell us your conditions and we will send along full data on Floodlight Projectors.

CROUSE-HINDS COMPANY

SYRACUSE, N. Y., U. S. A.

NEW YORK BOSTON CHICAGO



OLIVER EVANS' Steamboat of 1804 was built at Philadelphia for use as a river dredge. To convince people that steam power could be used for operating land vehicles he placed wheels under the dredge and ran it through the streets from Center Square to the Schuylkill River at Market Street under its own power.

This Convinced the Skeptics

who thought it impossible to operate a carriage by steam power. Yet only twenty-six years later the first American built locomotive was constructed for the Charleston & Hamburg Line and was successfully pulling loads heavier than those predicted by the most optimistic minds.

With the steady improvement in railway efficiency, the constant progress to greater loads, higher speeds, and better traffic conditions, new demands naturally arose for better materials in all departments of the business.

Not the least important of these was the demand for more efficient lubrication.

As usual, the need brought the supply.

Galena Oils

were tried by a few railroads at first. Their superior value was demonstrated beyond question. Their use increased rapidly. As lubricating demands became more exacting, Galena Oils met the new conditions.

Galena Service was developed and broadened so that the cost of lubricating railway equipment could be reduced and better lubricating methods would be adopted by the industry.

Today Galena Oils and Galena Service are lubricating the equipment of practically every steam railroad and most of the electric railways of the United States and Canada.

Galena-Signal Oil Co.
Franklin, Pa.

THE
CROIX de GUERRE

has been awarded the First and Second Groupements of the Great Headquarters Reserve No. 1 of the French Army, each operating 500 or more White Trucks. Citations for distinguished service accompanied the order, supplemented by a later citation to the entire Reserve No. 1, operating

2,500 WHITE TRUCKS

This is the first and only instance on record of motor transport formations in *any* army receiving this high honor.

The White Trucks were all veterans, many in continuous war service since 1914.

"White Trucks Have the Stamina"

THE WHITE COMPANY
CLEVELAND

The War is over, but not its effects

The Great War sickness is over but convalescence is going to take a long, long time—

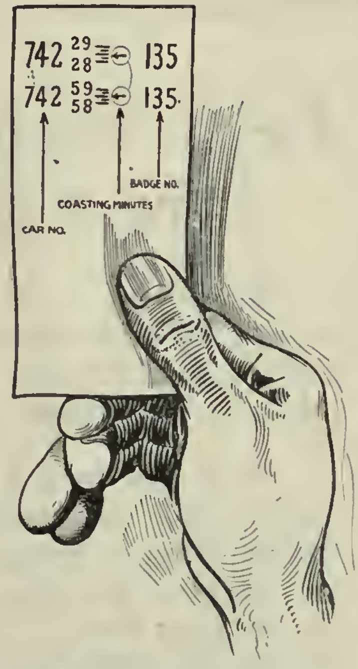
Especially the convalescence of electric railways which with few exceptions found their expenses rising faster than their income.

No easing of fuel restrictions can begin to make up for the urgent necessity of saving power, not simply to save coal, but to save *money*.

We urged you during the war to save coal as a matter of patriotism; we now urge you to save it as a matter of necessity.

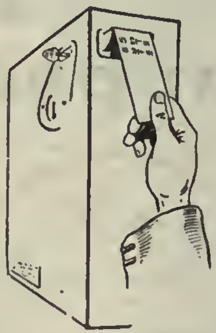
Your one best means of

Reducing Power Bills is through the



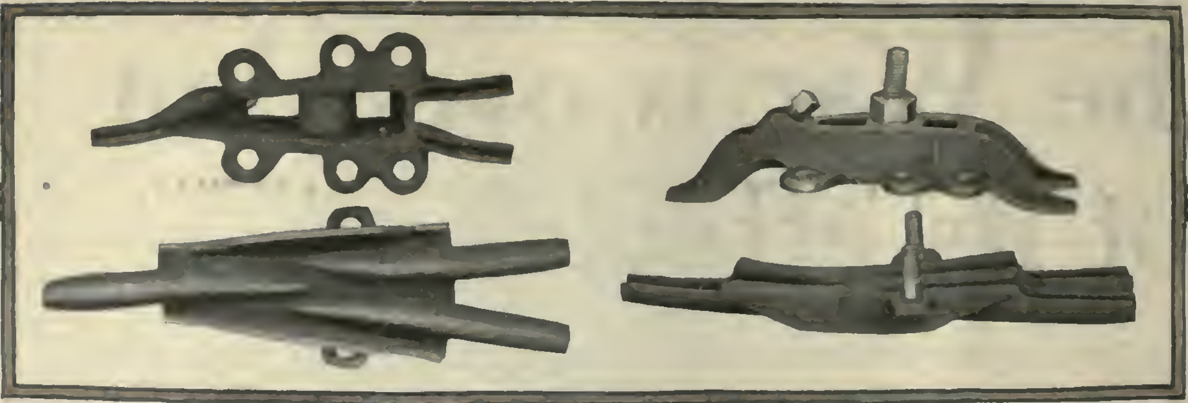
The Trip-by-Trip Record of Coasting Time is Printed Automatically

Rico Coasting Recorder



Time is the Essence of Railroading

RAILWAY IMPROVEMENT CO. 61 BROADWAY, NEW YORK



G-E Renewable-pan Frogs are a good investment

Wouldn't you like to know about a frog that will save time, money, labor and shorten delays to traffic? The light weight GE frog with renewable pan will do all these things besides saving much storage space.

With this frog a worn pan can be removed and a new one bolted on by one man in two minutes at a saving of half the cost of a complete new frog. You don't have to disturb the wires or use any tackle. You don't have to hold up cars as you do when the whole frog must be renewed. A small storage space will hold a great many pans and represent but half the investment of an equal number of spare frogs.

Isn't this worth investigating?

General Electric Company

General Office:
Schenectady, N. Y.

Sales Offices in
All Large Cities

40:30

A New Pan Makes the
Frog as Good as New

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Volume 53 New York, Saturday, January 4, 1919 *Number* 1

Journal Raises Subscription Price to Earlier Figure

AFTER resisting for many months the pressure put upon it by the enormously increased prices of everything the ELECTRIC RAILWAY JOURNAL is forced to raise its subscription price, the increase taking effect with the March 1 issue. The increase will be but one-third, so that even at the $4 rate the paper will still be supplied to its readers at a price lower than a number of other magazines in the same class have been forced to charge. Long-time readers of the paper will remember that they paid $4 a year for the STREET RAILWAY JOURNAL up to March 1, 1904, even when it was a monthly. The same causes which have operated to make an increase in fare necessary for the electric railways have been potent in the publishing business. The elements of increased expense in both cases are materials and labor. Take for example the item of paper. White paper of the quality used in the JOURNAL has increased more than 50 per cent in cost in three years; printing costs are a third higher, and engraving expense has gone up 75 per cent. In war time and pre-war time the JOURNAL was sold at a very low price considering the cost of producing it. Its watchword has been "service to the industry," and this included keeping the paper within the reach of all who ought to receive it regularly, but there is a lower limit to the price at which it can be produced. This note of explanation is in no sense an apology for the decision to raise the subscription price. In going back to the former price of $4 the publishers are still furnishing the paper at a price less than before the war in comparison to cost. If the paper is worth while at all, and the overwhelming testimony is that it is so, it is worth any reasonable price. A single idea derived from its columns in the course of a year will more than pay for the year's subscription.

A Definite Program for Immediate Action

After summing up the electric railway situation, in his article in this issue, Philip H. Gadsden says this:

I believe that the financially strong electric railway property groups should get together and support with their money and their executive talent a permanent agency which could do a number of things for the industry as a whole.

It could assist individual railways in solving their local problems by bringing to bear upon these the experience of other railways similarly situated.

It could conduct general publicity campaigns on behalf of the industry generally.

It could demonstrate to public bodies the facts in any particular local situation by furnishing incontrovertible data applicable thereto.

It could do many other things to make itself well worth while.

It is my earnest hope that something of this sort will be done, and done soon and that men of wide experience will show a readiness to give of their time and energy to save the industry from annihilation and permit it to serve the country with first-class transportation.

Electric Railway Statistics Permit Interesting Comparisons

IN THIS ISSUE we publish the statistical tables of rolling stock ordered and track built during the past year. Similar tables have been an important feature of our first issue of each year since 1907. In the analysis of rolling stock, three things stand out above the others. The first is the increase in the number of one-man cars. These cars in 1918 amounted to more than six hundred and constituted 37 per cent of all the cars ordered for city service, exclusive of those for subway and elevated railway use. Nearly all of the one-man cars ordered were of the uniform length of 27 ft. 9½ in. The second noticeable feature is the increase in the number of trailers ordered for interurban operation. This increase was no doubt influenced by the difficulty experienced in obtaining equipment due to war conditions and by the adaptability of train operation to service where large numbers of passengers are loaded and unloaded at single points as at the war industry plants. The third point is the large decrease in the number of home-made cars, due also in part at least to the scarcity of material and labor. As was to be expected, the track statistics show very little new track built. Actually, if the rapid transit extensions in New York City are deducted, it will be found that only four city systems built more than 7 miles of track, and of these four, two were municipal lines. The interurban situation is no better. One publicly owned railway in Canada built 28 miles of track. The aggregate interurban mileage for the United States and the rest of Canada besides this line was only about 90 miles, made up principally of spurs and short extensions, including, of course, those in whose cost the government assisted. More mileage of steam lines was electrified than in 1917, but this was due to the progress made by the Chicago, Milwaukee & St. Paul Railway.

Who Are to Run Our Cars?

ENTERING on a new calendar year we are also at the start of a period of reconstruction—a period which Judge Gary of the United States Steel Corporation predicts will be the most progressive, prosperous and successful in the country's history. This enormous work of reconstruction will undoubtedly demand the activity of every man and woman capable of taking part in the task. It will call for the organization of industry in such a way as to utilize to the full all of the available working forces of the country. There will be no place in the economic structure for any idle person—man or woman—rich or poor—who is physically able to perform useful service.

In this situation the electric railways are confronted with a problem which has frequently been mentioned in these columns and which grows all the more disturbing in view of recent developments. We have in mind the shortage in man-power for the operation of cars and the discouraging outlook for the employment of women substitutes because of certain recent rulings of the War Labor Board. The situation is best illustrated in Cleveland and Detroit, as told in two articles in the Dec. 21 issue of this paper. In the first-named city the company has been forbidden to hire more women conductors and directed to discharge those now in service before March 1. In Detroit the union has notified the company that no more women must be employed and that those now on the cars must be let out in the near future. This dispute is now pending before the War Labor Board.

The attitude of the Amalgamated Association toward women conductors has been hostile from the start, the alleged basis for this opposition being the claim that female employees were being introduced in order to reduce wages and to demoralize the unions. That this contention had no foundation is evident by the ready agreement of the companies to pay full union wages to the women conductors and to allow them to join the organization of the trainmen. In its latest pronouncement on the subject, the Amalgamated Association still contends that the position of conductor is not the place for a woman, although it says that when their employment in this capacity is necessary during the war they should be on the same basis as men as to pay, seniority and working conditions and should become members of the association.

In face of the continued shortage of suitable male employees for platform duty in many cities this attitude of organized labor—apparently sanctioned by the War Labor Board—offers a disheartening outlook for an industry which should be ready to meet the full requirements of the coming period of construction. Women have been employed as conductors on several properties in the United States as well as in foreign countries. We believe that experience has proved them adapted to the work; in fact, since the duties of a conductor have become primarily those of a cashier, as they have on most modern prepayment cars, may we not venture to say that women are better fitted for the place than men? All reports indicate that the average woman conductor is accurate, rapid, honest, courteous and enthusiastic in the performance of her duties. Several companies reported a decreasing list of accidents due to the greater caution of these employees. The public is satisfied in every city where they have been used. In brief, the statements in general indicate that the women conductors have made good. In view of the past year's experience we believe that there is a field for the woman conductor—a field of course with limitations. The employment of these women at the time was a patriotic duty. The companies which rose to the occasion and kept hundreds of extra runs in operation when no suitable men were available should not be discouraged now by any action of the War Labor Board.

The year just closed has been a hard one also for electric railways in having to meet the terms of the War Labor Board in the various awards affecting wages and working conditions. Admitting the justification for a living wage for the workman, the rulings of this board, which advanced the remuneration of street car employees about 50 per cent without providing the means for meeting this added item of expense, proved a real hardship in every instance. Several recent receiverships are a warning of the results of such a policy, and unless conditions in the nature of increased revenue improve shortly the coming year will prove disastrous for many more of the properties concerned. The labor situation, to say the least, offers a gloomy outlook.

The B. R. T. Goes Into Receiver's Hands

THE inevitable has happened and the Brooklyn Rapid Transit Company has gone into the hands of a receiver. This financial collapse will be a source of special regret to electric railway men because the company has made many important contributions to the science of railroading and is recognized everywhere as a leader in economical and scientific operation. Nevertheless, it has been compelled to acknowledge defeat in its tremendous struggle against the odds of continually increasing expenses with a fixed fare.

The list of electric railways which have passed into receivership during 1918 is far larger, measured in number of companies, miles of single track or capitalization, than in any previous year, and other companies will follow soon unless remedial steps are taken. It is significant that in New York State two of the three largest electric railway properties, those in Brooklyn and Buffalo, have confessed insolvency, and the president of the third among the large railway systems, the Interborough Rapid Transit Company, warns its partner in the dual subway agreement, the city of New York, that it too is in danger of being starved into bankruptcy unless remedial measures are begun promptly.

There is but one answer to the New York situation. The present Legislature should promptly grant power to the present public service commissions, or to their successors if new commissions are to be chosen, to permit the companies to charge an adequate fare. The city authorities should co-operate where they have power to do so and have not exercised it.

This is not only the counsel of justice but of expediency. Electric railway service is a public necessity and its cost must be met. The conditions under which these companies suffer are not local but general. Relief, and given quickly, is the best as well as the only fair course possible.

The Prospects for 1919 Surveyed

IS THE débâcle at hand for the electric railway industry in the United States? Is the year 1919 to witness a series of financial disasters in this great class of public utilities? We hope our next annual Statistical Number will not have to record such a story of cataclysm, yet we do not hesitate to predict that the financial record of the coming twelve months will include many an item of bankruptcy for these properties unless prompt and sufficient means are devised for meeting their dire need of additional revenue. We have just discussed the situation in New York City. That in the country at large is not greatly different.

Last August the War Labor Board handed down a batch of awards fixing new wage scales for electric railways whose employees had appealed to this tribunal for the means of meeting the increased cost of living. The new wages were generous but not out of proportion to the rates paid at that time to other labor. The difficulty in the situation, however, was that most of the companies affected had not the resources with which to meet the added expenses. The members of the board appreciated the dilemma in which the companies were placed, but they could do nothing except call attention to the situation and make recommendations for relief by federal or local authorities.

Except in a few instances, the public has not shown a disposition to measure up to the standard of fair dealing which the board set before them. In some cases state utilities commissions or municipal authorities have extended a helping hand to the suffering transportation agencies, but this aid has rarely been sufficient to give adequate relief. In a greater number of cases the authorities have either refused an increase in fares or are withholding action while creditors knock at the doors of the distressed companies. Meanwhile service suffers and these utilities are unable to do their share in the great period of reconstruction which is at hand.

The threatening outlook can be no better pictured than by noting the experience of the Chicago City Railway, which recently passed its dividends for the first time since dividends were initiated in 1870. This is one of the two main properties, and the most prosperous, of those composing the Chicago Surface Lines. The regular quarterly distribution was omitted because the company not only is failing to earn anything for the stock, but is not earning 5 per cent on the city purchase price. President Busby explained that this action was caused by the wage increase ordered by the War Labor Board, the increased cost of supplies and the falling off in gross receipts due to a decrease in traffic. The Surface Lines petition for a 7-cent fare has been pending before the State commission for several weeks and the frequently delayed hearings prompted one of the attorneys to state that another of the component companies faces serious financial troubles if it cannot meet its bond interest on Feb. 1.

The Boston Elevated situation is only less alarming because its failure to produce adequate revenue through earnings is offset by the guarantee of dividends through the State taxing power. This case, however, is an unusual illustration of the effect of fare increases on traffic. Under public trustee operation, with the power to alter fares to meet the cost of service, fares were advanced last August from a 5 to a 7-cent basis. Passenger revenue for the first month increased about 24 per cent. For the second month it showed a gain of 12 per cent, while for the third month—due largely to the effect of the influenza scare—the gain was only 1 per cent instead of the possible 40 per cent under the new rate. On Dec. 1 the fare was raised to 8 cents, but on account of the resulting traffic losses the increase in revenue was so small as to be ridiculous. It has been stated that a 10-cent fare would pay the Boston Elevated bill provided everybody who used the cars last year at 5 cents would be compelled to ride this year and pay 10 cents.

This brings us to the critical question being asked by railroad men all over the country, namely, "What system of fares will enable us to get out of our difficulties?" Some companies have gone from a 5 to a 6-cent basis and instead of the theoretical increase of 20 per cent in revenue, the reports show anywhere from 8 to 14 per cent. Others having tried a 7-cent fare, with the possibility of a 40 per cent gain, report gains from 1 to 24 per cent. A few have been collecting 8 cents, and instead of the theoretical gain of 60 per cent in earnings they show from 9 to 14 per cent. Ten-cent fares have been tried elsewhere, and it is possible that some companies will experiment with rates even higher.

The receiver of the Bay State system stated recently that this constant irritation of the public by little jabs at the problem is responsible for a large part of the railway troubles. He favored a jump to a rate considerably higher so that changes hereafter will be in the direction of lower fares. There are other thoughtful operators who expect to find eventual relief only in a zone system of fares. Still another group are coming to agree with the view recently expressed in the Bay State fare case that "it is wiser to place a part of the burden of the cost of necessary electric railway service directly upon the community as a whole than to suffer increases in fare which do not produce the results that they are designed to produce, and which are seriously disturbing to social and economic conditions."

The concentration of trained minds on this problem is bound to find a solution in time. A solution will be found because electric railways are essential to the national life and someone must pay for their continuance. Further receiverships may be required to awake the public and the authorities to the danger, but it will be unfortunate indeed if such a price has to be paid to attain justice. The subject is receiving much publicity, and the public we think realizes, as never before, that early action is necessary. What that action might be is suggested in the extended article in this week's issue by L. R. Nash of Stone & Webster, who reviews at length the principal service-at-cost franchises in existence or proposed. The Merchants' Association in New York has appointed a committee to report on the subject and similar action will be taken by the United States Chamber of Commerce. We have no doubt that through the work which is being done in and outside the industry the long dormant sense of fairness in the mind of the prejudiced public will be roused and the utilities which have been crowded to the brink of disaster will be saved. We confidently believe that the year 1919 will bring the dawn of an era of understanding and fair dealing.

Cohesive Spirit of Electric Railway Industry Must Be Conserved and Intensified

Results of Activities of Temporary War-Time Organization Will Be Partly Lost Unless Effort Is Made to Capitalize and Stabilize Them—A Number of Very Definite Utility Problems of a National Character Await Solution

BY PHILIP H. GADSDEN
Chairman Readjustment and National Relations Committees,
American Electric Railway Association

PHILIP H. GADSDEN

Mr. Gadsden has done notable work for public utilities generally, and for the electric railway in particular, during and before his time of residence at Washington as local representative of the Electric Railway War Board. Mr. Gadsden is president of the Charleston (S. C.) Consolidated Railway & Lighting Company. He was educated in the Charleston schools and at the University of South Carolina, from which he holds the degree LL.D. He practiced at the bar for fifteen years and also served for six years in the State legislature.

THE publication of the annual review issue of the ELECTRIC RAILWAY JOURNAL renders especially timely a retrospective view of the condition of the transportation utility during the past year under war conditions. But such a retrospect is warranted only if it furnishes help for the future. The American Electric Railway Association has appointed a committee on readjustment, the purpose of which is to assist electric railways in tiding over the period on which we are now entering. Before it has finished its work this committee will presumably have definite recommendations to offer with reference to some permanent way of conserving the gains in co-operative spirit which have been made during the war period. Otherwise the sacrifices and concessions made will largely have been in vain. And this matter must be considered not alone in the light of the needs of this one industry, but rather of the needs of public utilities as a whole. An industry representing a capitalization of ten billion dollars, and involving the welfare of hundreds of thousands of stockholders and bondholders and the comfort and convenience of many millions of citizens must speak as one voice for the principles of fair dealing and justice for which the great war has been fought and won.

RECONSTRUCTION IS IN THE AIR

The emergency conditions of the war are passing, but they have not yet passed and will probably not disappear entirely for many months. Coal prices are dropping, materials prices will follow, labor conditions arising out of the war will be slow of readjustment, the revenue bill is still in controversy and public ownership is open for national discussion. Furthermore, the reconstruction or adjustment programs of many civic and governmental bodies are just beginning to be shaped. As a step in this direction, the Zihlman bill, offered in the House of Representatives on Dec. 12, provides for a "reconstruction commission" of ten members to study post-war conditions, recommend principles of uniform legislation for all states and consider the problems of labor, capital, credit, public utilities and other matters.

But before going into details regarding reconstruction let us note for a moment the present situation which confronts us. The electric railway industry, due to conditions brought about by the war, is practically bankrupt. It has been subjected not only to the general rising costs of materials but also to the particularly burdensome labor awards of the National War Labor Board. Its needs, as brought to the attention of the federal authorities a year ago, have not brought forth remedial action of a general character. As a result, the electric railways, with few exceptions, find themselves at the close of the war with ruined credit and deteriorated equipment, unable to give adequate service, and in many communities, objects of hostile and unreasoning criticism.

The facts and figures presented by the writer at the war emergency and reconstruction congress of the United States Chamber of Commerce as reprinted in the issue of the ELECTRIC RAILWAY JOURNAL for Dec. 14, 1918, page 1045, indicate very clearly the problems that must be solved. Whether they shall be solved by the politicians and reformers or by the industry depends upon whether a defensive or an aggressive policy is adopted by the operators of the electric railways. Furthermore, the manner in which the electric railway problem is handled will, in a very large measure, determine how the problems of other public utilities are to be handled as they arise.

THESE ARE THE BOLD FACTS TO BE CONSIDERED

Briefly, then, the rehabilitation of the industry must be undertaken aggressively, with a recognition of the following facts:

1. As an industry, the electric railway industry is practically bankrupt.
2. Its service is essential to the health, progress and development of every community, hence to the nation itself.
3. The present rate structure is economically unsound, and the present basis insufficient to take care of

increased wages and standards, together with the higher scale of material costs likely to continue for many months.

4. The public authorities, whether state public service commissions or municipal bodies, must be made parties to the readjustment on a co-operative rather than an antagonistic basis.

8. Adequate and satisfactory service to the public is the primary end in view.

The war has taught the industry that the local franchise relationship is inelastic and non-responsive to the economic laws upon which all industry must be founded. It has shown that irretrievable loss is in practically all cases made a condition precedent to the granting of rates that will provide an adequate return. Such irretrievable loss means poor service and public dissatisfaction, hence adequate service and public satisfaction must be insured by some form of public responsibility in the revenues necessary for maintaining such service.

Whether the public's financial responsibility can be worked out through a readjustment of present rate structures and service schedules, or whether the funds necessary shall be furnished from the public treasury, is in a sense a collateral question, as long as the importance of electric railway development as essential to the nation's life and progress is regarded as the prime consideration.

SOME DEFINITE PROBLEMS FOR SOLUTION

The problems for the industry to solve may be considered briefly as follows:

1. It must learn how to conduct an educational campaign which will give the public a point of view from which it will be able to deal with the railways on an equitable and therefore fair basis. In this connection data must be widely distributed so that the public will obtain a proper concept of the costs of building, equipping and operating electric roads, and the utilities must virtually be opened through advertising channels for public inspection. Further, the railways must suggest such inferences from present conditions as to stimulate public thought on the railway question, with special emphasis upon the idea of public interest.

2. The problem of public ownership versus service at cost must be attacked.

3. Due consideration must be given to the merits of quasi-public ownership as compared with the service-at-cost plan.

4. Franchise relationships must be studied.

5. The industry must investigate the extension of state commission jurisdiction under proper laws, particularly with relation to responsibility for financial and service conditions.

In connection with the latter requirement it is interesting to note that during the war the National Committee on Public Utility Conditions investigated the rate situation as affecting the electric railways for the first six months of 1918. During that period 236 rate increases were allowed electric railways by state commissions, whereas during the same period only eighteen were allowed by municipal authorities. It was also shown that in twenty-two states electric railway rates are subject to regulation by municipal authorities. A number of important states in which public service commissions exist fall into this group because of the action of the supreme courts of those states in depriving the commissions of jurisdiction over rates fixed by local franchise.

MANY RECONSTRUCTION FORCES ARE AT WORK

The working out of any such program as herein outlined is not to be confined to any one committee but is to be made a part of the general reconstruction program of the nation. Already reconstruction committees have been organized and relationships established between those committees and the readjustment committee of the American Electric Railway Association. Among these reconstruction committees should be mentioned the following:

1. The special war committee of the National Association of Railway and Utilities Commissioners which is to be continued as a reconstruction committee in Washington, D. C. Its program is a study of the entire problem of public regulation of railroads and public utilities. Among the points for consideration mentioned by the president of the association in his address at its recent convention was this: "Perhaps the time has come for our association to consider the advisability of recommending a change in the contract relationship of these utilities." This statement referred especially to electric railways and their embarrassment during the war by the restrictions imposed by local franchises. Continuing the president said: "One of the methods suggested is that state laws or constitutions be so modified as to give all state commissions jurisdiction over rates of utilities, and that an indeterminate permit free from all local limitation as to rates be issued upon the surrender of the existing license or franchise."

In the report of the committee on public utility rates, presented at the convention, it was suggested under "Electric Rates" that an automatic sliding scale might be desirable, based upon fluctuating costs of material and labor where the state commissions have adopted uniform cost accounting for public utilities. Under "Street Railway Rates" the report states "among utilities most seriously affected by war conditions because of increased cost of fuel, material and labor, are the street railways. It is believed that when it is possible to do so, the zone system offers the most practical method whereby increased income may be obtained. Where zones are already established, an increase in number of zones or a shortening of the zones will usually yield the increased revenue desired." Many other important statements are made with reference to the rates of other utilities. These are some of the problems that will be considered by the reconstruction committee.

2. Reconstruction committee of the National Civic Federation. This committee has listed public utilities among the subjects to be studied, and the thoroughness with which the federation makes its investigations is well known to those familiar with its work.

3. Special committee of the Merchants' Association of New York. This committee is to study and report upon the question of governmental ownership and operation of public utilities and industrial undertakings. A note regarding it and giving its membership will be found in the issue of the ELECTRIC RAILWAY JOURNAL for Dec. 14, 1918, page 1063.

4. A committee of the United States Chamber of Commerce, provided for in the following resolution

adopted by the recent War Emergency and Reconstruction Congress:

> Public utilities have faced difficult problems, which have been accentuated by conditions arising out of war. The development and efficiency of such a utility as local transportation has immediate importance for every community. It is recommended that the Chamber of Commerce of the United States should appoint a committee to investigate and study the question of local transportation as it relates to the control of rates and service, franchises, taxes, the attraction of capital into the business, and such other questions as the committee may find pertinent. Such a committee should report its recommendations to the board of directors of the national chamber, and the board should deal with them in accordance with the established procedure of the chamber.

5. A special committee of the United States Chamber of Commerce to be made up of the representatives of industry and the chairmen of the war service committees, represented at the recent Reconstruction Congress. It will include the chairmen of the public utility war service committees that have been organized during the war. Thus, the public utility industry will have representation on this special committee in any work that is undertaken.

> THE war has taught the industry that the local franchise relationship is inelastic and non-responsive to the economic laws upon which all industry must be founded. It has shown that irretrievable loss is in practically all cases made a condition precedent to the granting of rates that will provide an adequate return. Such irretrievable loss means poor service and public dissatisfaction.

6. The readjustment committee of the American Electric Railway Association, to which reference has already been made. In addition to these six reconstruction committees and the bill now before Congress providing for the appointment of a federal reconstruction commission, there should be mentioned the various organizations that are likely to be appointed for the readjustment period, growing out of the activities of the War Finance Corporation, the National War Labor Board, the War Labor Policies Board, the Capital Issues Committee, the War Industries Board and the Council of National Defense.

Furthermore, it is probable that a committee on reconstruction finances will be appointed by the Investment Bankers Association of America, to co-operate with the other committees in relation to financial problems confronting the public utility industry.

In addition to the above, conventions of local public utility associations will be called for the consideration of reconstruction problems. Such a step has already been taken by the Illinois Electric Railways Association, which the writer hopes to be able to address on the occasion of the meeting to be held in Chicago on Jan. 17.

While a wide influence can be exerted through the activities of the above organizations, if properly guided and informed by a central committee, much additional work can be done through the various civic bodies and associations in the various states.

RECONSTRUCTION PLANS MUST BE MADE DEFINITE

One of the chief problems now presented to the electric railway industry is to determine promptly upon the fundamental points that should be urged before these various reconstruction committees and other bodies for consideration. The reconstruction committee of the American Electric Railway Association has already considered a few of the points that should be referred to the special committee on electric railway transportation of the United States Chamber of Commerce. The points suggested for reference to that committee are as follows:

1. A study of the various classes of electric railway franchises, the unusual as well as the usual forms, with a digest of the same, indicating the burdens and requirements imposed upon electric railways, including paving requirements, free transfers, free carriage of certain classes of passengers, compulsory extensions into unproductive territory, etc. Some estimate of the total amount expended by the industry annually on account of paving requirements should be included.

2. The various forms of taxation to which electric railways are subjected, including city, county, state, federal, ad valorem, franchise and gross income taxes.

3. A formulation of some plan looking to the standardization of burdens and requirements and a segregation of the industry for purposes of taxation.

3. Service-at-cost plans, as compared with out-and out municipal ownership, indicating the advantages of quasi-public interest service and finances.

5. Comparison of results of state commission regulation with regulation through municipal bodies.

6. Uniform state commission laws or a standard franchise.

So much for a general program on reconstruction. Next, how is even a satisfactory program to be made effective?

A STRONG CENTRAL AGENCY IS NEEDED

Unless some agency which is financially strong can be set up to put the plan into operation the whole matter will be in danger of resolving itself into a mere academic discussion—reports, resolutions, compliments, but nothing more. I believe that the financially strong electric railway property groups should get together and support with their money and their executive talent a permanent agency which can do a number of things for the industry as a whole, among which I need mention only the following:

1. It could assist individual railways in solving their local problems by bringing to bear upon these the experience of other railways similarly situated.

2. It could conduct general publicity campaigns on behalf of the industry generally.

3. It could demonstrate to public bodies the facts in any particular local situation by furnishing incontrovertible data applicable thereto.

This influential central agency could do many other things to make itself well worth while. It is my earnest hope that something of the sort suggested will be done, and done soon and that men of broad practical knowledge and wide experience will show a readiness to give of their time and energy to save the industry from annihilation and permit it to serve the country with first-class transportation.

Transportation Work of the United States Housing Corporation

Under the Supervision of the Transportation Division 300 or More Cars Have Been Purchased and Much Work Undertaken to Facilitate Housing of War Workers

BY GARDNER F. WELLS
Manager Division of Transportation, United States Housing Corporation

AFTER the United States had been at war with the central powers for some months it became apparent to the government officials that they were being seriously hampered in the task of supplying the munitions of war by the lack of housing facilities for workers in the vicinity of war manufacturing plants. The same conditions surrounded the production of merchant ships also, but fortunately the United States Shipping Board was supplied with the funds necessary for solving the housing problem as soon as the circumstances were appreciated and the necessary legislation to enable the funds to be applied to housing and transportation could be passed. No such provision could be made for the workers in munitions plants until Congress should take special action to provide funds for this purpose, together with an organization to dispense these funds effectively. This was done in the spring of 1918 and on May 16, 1918, an act was passed to authorize the President to provide for housing needs. The President signed the bill on June 26 and the work was delegated by him to the Secretary of Labor, who instituted the Bureau of Industrial Housing and Transportation. Of this bureau Otto M. Eidlitz was made director. To facilitate the administration of the work the United States Housing Corporation was incorporated on July 8 with Mr. Eidlitz as president, and funds became available on July 25. As a part of the activities of the corporation a transportation division was organized and the writer was made its manager.

GARDNER F. WELLS

Mr. Wells was associated with Stone & Webster, Boston, for fifteen years until March, 1916, when he took up his present work as head of the corporation bond buying department of Arthur Perry & Company, Boston. After leaving the Massachusetts Institute of Technology he spent ten years with the Thomson-Houston and General Electric Companies in engineering construction and management work, and followed the same general line with Stone & Webster. He was commissioned major in the Army Ordnance Department in 1917, on leave of absence from his firm, but resigned to take up his present work with the Housing Corporation.

WHY THE TRANSPORTATION DIVISION WAS CREATED

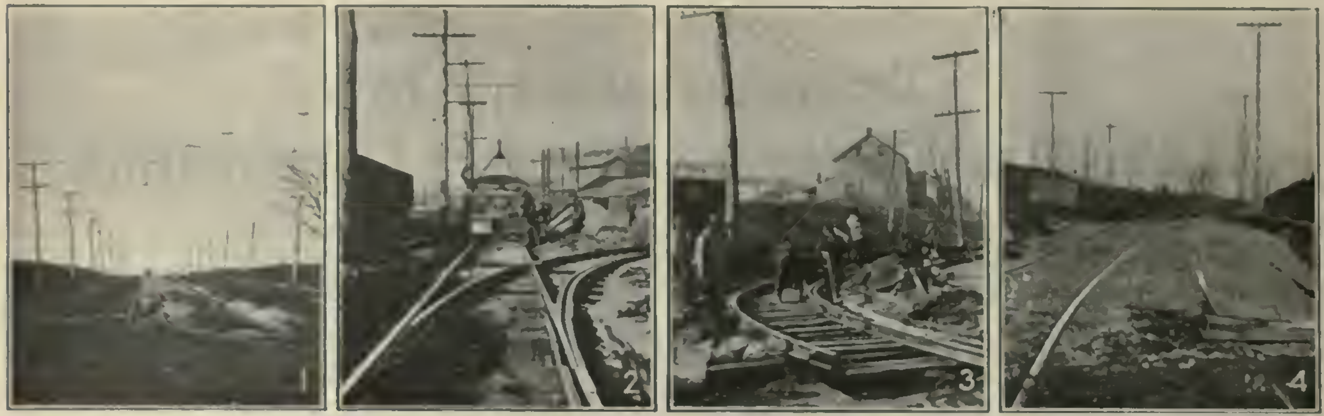
This transportation division was organized for the purpose of improving present, and creating new, transportation facilities for war industrial workers, in accordance with the act of Congress already mentioned. Among other things this act anticipated that in certain localities it would be found that transportation would solve the housing problem. This could be brought about by making communities where there were vacant houses in abundance available to employees in congested industrial centers through improved transportation facilities. It was also anticipated that improvements to local transportation systems in communities where intensive war manufacturing was being carried on would materially add to the speeding up of the work.

That transportation supervision might properly be administered, ample provisions were made in the act for equipping, managing, maintaining, purchasing, leasing, constructing, requisitioning or acquiring by condemnation such transportation lines as might be necessary to provide adequate transportation facilities for industrial employees engaged in war work. This act also carried with it the appropriation of certain funds for the beginning of this work. Subsequent acts have further increased the funds available.

Many special requests for assistance have come to this division from railway companies or manufacturers, but a strict interpretation of the act of Congress indicated that the work to be handled by the division was to be considered from the standpoint of war necessity. The work was therefore confined principally to requests coming from the War and Navy Departments.

The transportation division consists of manager, assistant manager, consulting engineer, three investigating engineers, one construction engineer, a division manager at New York City, as well as an office manager and two investigating engineers, one consulting engineer and two assistants at Chicago, a consulting engineer at Philadelphia, one construction engineer at Erie and one division manager and two construction engineers at Hampton Roads, together with the necessary clerical assistants in the several offices.

The principal work of the division has covered: (1) The installation of special steam and electric train service for war workers. (2) The rearrangement of steam and electric railway schedules. (3) The financing of necessary electric railway extensions and additions. (4) Construction or supervision of construction of these extensions or additions.



TRACK CONSTRUCTION WORK AT BETHLEHEM, PA.

Fig. 1—Looking west on Broad Street from Minsi Trail Street. Fig. 2—East leg of wye, Day Avenue. Fig. 3—West leg of wye. Fig. 4—Looking north on Minsi Trail Street, from Market Street to Broad Street.

Through the efforts of the division, twenty-one special steam trains, to provide transportation for war workers, have been installed in various parts of the country. The Railroad Administration has established an especially low tariff for these workers, and in many instances the Housing Corporation has granted still lower rates, absorbing the incidental differentials. By this arrangement a large amount of vacant housing has been made available. At least 8000 people have been cared for in this manner at a cost which will not be more than $275,000 to the division, based on this service being in operation for one year. This is at the rate of approximately $35 per man per year.

The experience of the Housing Corporation shows that the average cost of housing a war worker in a dormitory completely equipped and furnished with cafeteria, etc., is $550, while the cost of housing workers in homes built especially for them is from $3,500 to $5,500 per house, the assumption being that the average number of workers occupying each house will be two. On this basis it will readily be seen that, through transportation improvements, millions of dollars of investment have been saved.

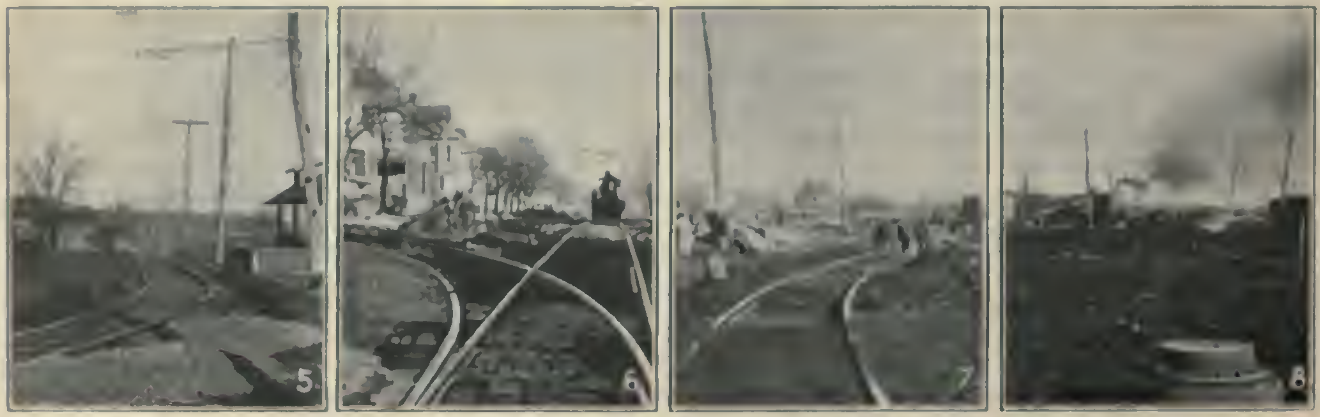
In accordance with recommendations made to the regional directors of the railroads under federal control, and through the co-operation of the United States Railroad Administration itself, war workers have been benefited in many localities by rearrangement of schedules and institution of extra stops on steam railways, and by rearranging schedules on electric railways.

In many instances it was reported by either the War or the Navy Department that electric railway service in connection with war industries was entirely inadequate. In every such case a careful investigation and study of conditions was conducted, recommendations were made and estimates of cost were compiled for necessary improvements.

THE HOUSING CORPORATION PROVIDES THE FUNDS

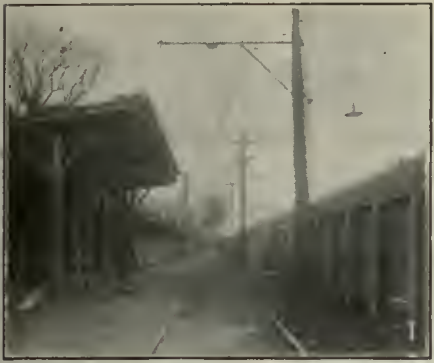
When it was determined that new and additional transportation facilities were required, plans or recommendations therefor were presented to the companies with the request that measures be taken immediately to acquire or install the necessary extensions, additions or betterments. These recommendations usually involved an expenditure for their accomplishment. In all cases the companies pleaded that they were unable to finance the cost of the work at a reasonable rate of interest. They also objected to making expenditures at the time because of the abnormal costs of labor and material and the fact that the operation of these extensions and additions was unprofitable. It was also held by them that the service was for rush hours only and that these periods were the most costly to operate. In spite of the foregoing, however, they invariably agreed, from patriotic motives, to carry out the Housing Corporation's recommendations, with its assistance and under its supervision.

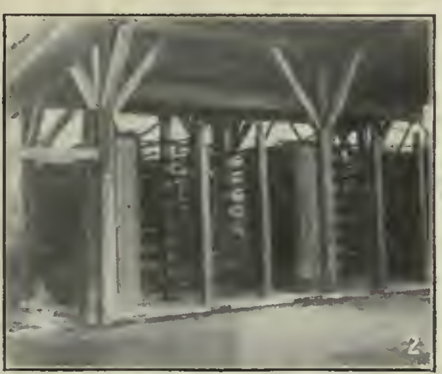
When it was decided what improvements should be carried out, contracts were entered into with the local

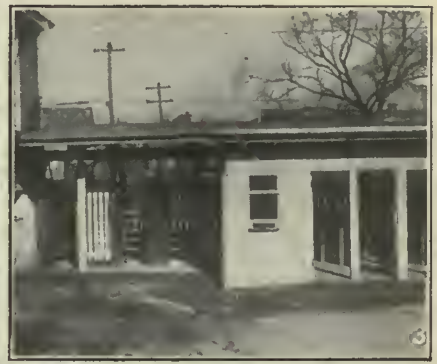


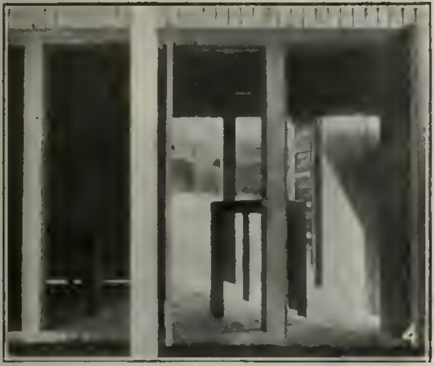
TYPICAL TRACK JOBS AT BETHLEHEM, PA.

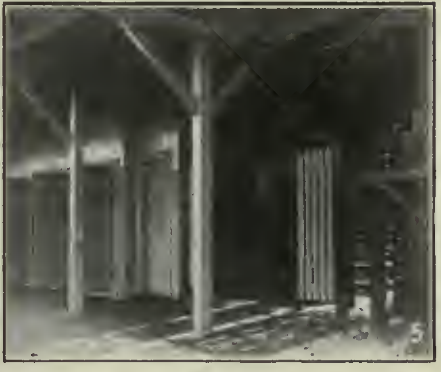
Fig. 5—Looking north on Minsi Trail Street from Broad Street. Fig. 6—Looking east on Broad Street from Linden Street. Fig. 7—Looking northeast on Newton Avenue. Fig. 8—Looking northeast on Newton Avenue from Road No. 1.











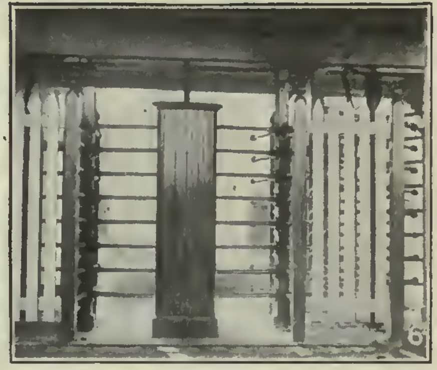


Fig. 1—Prepayment area at Watertown Arsenal.

Fig. 2—Turnstiles at exit.

Fig. 3—General view of entrance-exit structure.

Fig. 4—One of the prepayment entrances.

Fig. 5—Another general view of the entrance-exit arrangement.

Fig. 6—Close-up view of a turnstile.

Fig. 7 — Bridge Street, southwest of Milnor Street, Philadelphia, near Frankford Arsenal.

Views showing construction work at federal arsenals in Boston and Philadelphia done under supervision of the transportation division of the United States Housing Corporation. Figs. 1 to 6, Watertown Arsenal, Boston; Figs. 7 to 12, Frankford Arsenal, Philadelphia.

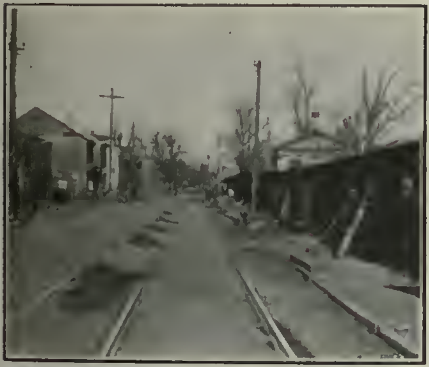
Fig. 8 — Bridge Street north of Frankford Creek—arsenal buildings in background.

Fig. 9—Bridge Street looking northwest from Thompson Street.

Fig. 10 — Bridge Street looking northwest from Milnor Street—arsenal gate at right.

Fig. 11—Pratt Street looking northwest from Richmond Street.

Fig. 12 — Same looking northwest from Salmon Street.



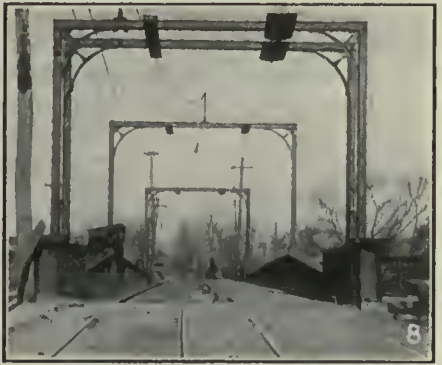


TABLE I—STATUS OF LOANS AND PROPOSED LOANS AS OF DEC. 17, 1918

Locality	Name of Company	Contract Executed for Loan	Loans Recommended in Reports	Allotment Annulled
Bethlehem, Pa.	Lehigh Valley Transit Co.	$650,000		
Bridgeport, Conn.	The Connecticut Co.	1,350,000		
Boston District				$462,000
Boston-Watertown	Boston Elevated Ry.	38,000		
Buffalo, City of Buffalo-Niagara				500,000
Buffalo-Depew	Buffalo & Depew Ry.	74,000		
Charleston, S. C.				300,000
Chicago, Ill.	Chicago City Ry.	235,000		
Dayton, Ohio				500,000
Erie, Pa.				100,000
Gary, Ind.	Gary & Valparaiso Ry.	33,000		
Gary, Ind.	Gary Street Ry.	169,000		
Hammond, Ind.	Hammond, Whiting & East Chicago Ry.	315,000		
Hegewisch, Ill.	Calumet & South Chicago Ry.	150,000		
Hilton, Va. (Newport News, Va.)	Newport News & Hampton Ry. Gas & Electric Co.	*150,000 25,000	G$65,000	
Milton, Pa.	Lewisburg, Milton & Watsontown Passenger Ry.	25,600		
Neville Island, Pa.				2,700,000
Newark District	Jersey Central Traction Co.		67,000	
Newcastle, Del.				100,000
Niles, Ohio				300,000
Norfolk District				1,700,000
Norfolk, Va.	Virginia Ry & Power Co.	300,000		
Pensacola, Fla.				100,000
Philadelphia District				456,000
Philadelphia, Pa.	Philadelphia Rapid Transit Co.	2,284,000		
Rock Island, Ill.	United Light & Ry. Co.	105,000		
Seven Pines, Va.	Richmond - Seven Pines Ry.	*118,147		
Toledo, Ohio				500,000
Tullytown, Pa.				150,000
Washington, D. C.	Washington Ry. & Elec. Co.		125,000	475,000
Washington, D. C.				400,000
TOTALS		$6,021,747	$257,000	$8,743,000

SUMMARY:	
Contracts executed	$6,021,747
Loans recommended	257,000
Allotments annulled	8,743,000
Total	$15,021,747

*Purchase by Housing Corporation.

transportation companies whereby the Housing Corporation financed the undertaking on a 5 per cent interest basis. In most instances the government is to bear the excess war cost, this to be determined in the following manner.

An appraisal of the additions and extensions to the properties is to be made on a date fixed by the Housing Corporation within a period of from one to three years after the declaration of peace, to determine their then cost to reproduce new. The difference between this appraisal and the actual cost of the work is termed the war excess cost, and this difference is to be borne by the government. Where funds have been advanced, the companies have been required to furnish proper security by lien, mortgage or pledging of securities, or guaranty of another and responsible corporation. The amount as determined by the appraisers is in substantially all cases to be returned to the government in five equal annual installments, payment of the first installment being due one year after the date of the appraisal.

In accordance with the above arrangement the government, through the Housing Corporation, has contracted to advance about $6,000,000 to various traction companies. The total appropriations for the transportation division originally amounted to $15,000,000. As soon as the armistice was signed, the amount was cut down to approximately $6,500,000. There may be a further reduction due to the omission of some of the work planned. A general summary of the division's expenditures is as follows:

Executed contracts with electric railways	$6,021,747
Loans with electric railways recommended	257,000
For operating steam trains	137,500
Transportation division administration expenses and overhead (six months)	30,000
Total	$6,446,247

The first loan executed was with the Connecticut Company, on July 31, and the last was with the Philadelphia Rapid Transit Company on Nov. 8, the total period covered, therefore, being about three and one-half months. One road was purchased, the Richmond-Seven Pines Railway, for the sum of $118,147.

FINDING CARS FOR ELECTRIC RAILWAY NEEDS

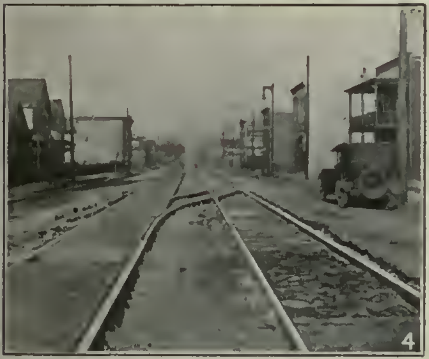
Naturally the primary need of the electric railways serving war plants was for cars, and the division promptly made arrangements to supply a considerable number, totaling to date more than 300. Most of these were new cars of the local companies' standard types. New double-truck cars to the numbers indicated were purchased for the following: Lehigh Valley Transit Company, fifteen; Connecticut Company, fifty; Gary & Valparaiso Railway and Gary Street Railway, twelve; Hammond, Whiting & East Chicago Railway, ten; Lewisburg, Milton & Watsontown Passenger Railway, three; Newport News & Hampton Railway, Gas & Electric Company, ten; Philadelphia Rapid Transit Company, 110. Twenty one-man cars were also purchased for the Connecticut Company and fifty for the Virginia Railway & Power Company for use at Norfolk. Some second-hand cars (eight motors and four trailers) were supplied to the Buffalo & Depew Railway; three to the Jersey Central Traction Company, and eight old Interborough Rapid Transit Company cars to the Virginia Railway & Power Company. The one-man cars mentioned were of the standard Birney type, and two of the Gary cars were of the double-end Peter Witt type, nearly like the Housing corporation's proposed "standard" car.

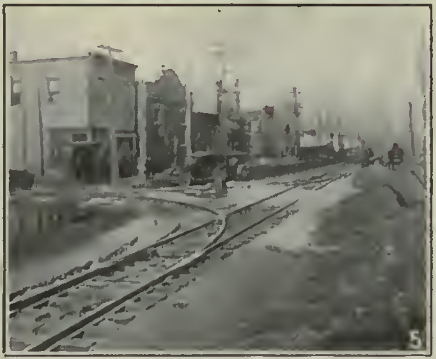
The "standard" type, of which the corporation but for the signing of the armistice would have ordered fifty at once, was developed to simplify the matter of ordering double-truck cars and to render the cars salable after the war in case the local companies should prove to have no further use for them. At the request of the Housing Corporation the War Board of the American Electric Railway Association appointed a committee to consider plans for a design of car which would be adapted to the corporation's needs. As a result the committee approved for the purposes outlined two types of double-truck car, as described in the issue of the ELECTRIC RAILWAY JOURNAL for Oct. 26, 1918, page 729. Special credit is due to C. O. Birney of Stone & Webster, Boston, Mass., for his work in preparing plans for the consideration of the above-mentioned committee.

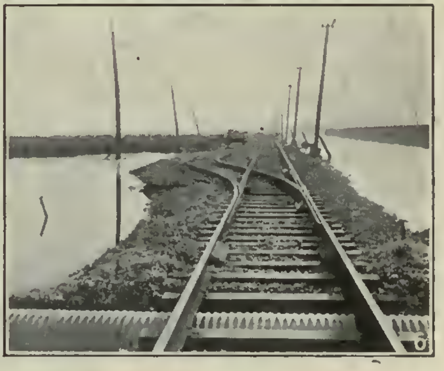
TRACK EXTENSIONS WERE ALSO A FEATURE OF THE DIVISION'S ACTIVITIES

In addition to the provision of rolling stock the Housing Corporation financed many track improvements, and in more than one case assisted in increasing power facilities. A notable example of this work is furnished by the Plaza "dumb-bell" loop at Bridgeport, Conn., an improvement to facilitate loading and routing of the cars in that important munitions center. Other extensions and rearrangements in Bridgeport bring the total expense at that point to about $1,333,000. At Boston, Mass., a loop and prepayment station for the Watertown arsenal involved an expenditure of about $40,000.

A very large proposition was a double-track extension of the Chicago (Ill.) City Railway to serve the United States Quartermaster Depot. This extension is a mile in length, is located on Thirty-ninth Street between Ashland and Western Avenues, and cost about $230,000. In the same city $150,000 was spent for nearly 12,000 ft. of single-track equivalent for the Calumet & Chicago Railway to benefit employees of the Pressed Steel Car Company and the Ryan Car Company. One of the largest single jobs was at Philadelphia where, besides the large number of cars supplied, additional substation and feeder capacity was furnished as well as storage tracks, etc., all to accommodate the workers at the League Island Navy Yard. These improvements cost more than $1,000,000. Similar work in the Eddystone district cost nearly $600,000, and more than $500,000 was spent on extensions, a rotary substation, direct-current feeders, a terminal loop, etc., at the Frankford Arsenal. These examples are cited merely to show how diverse has been the task of the transportation division and how wide the territory over which its work has been spread.







TRACK CONSTRUCTION IN CHICAGO

Fig. 1—Forsyth Avenue, looking south from Chicago Avenue, showing double-track, the second track having been installed to facilitate movement of cars at a very heavy loading point.

Fig. 2—Hegewisch extension, on Brandon Avenue, looking south from steam railroad crossing. Double-track begins where car is seen.

Fig. 3—Hohman Street, looking south from point near N. Y. C. R. R. track, showing second track installed to complete double-track line to Chicago.

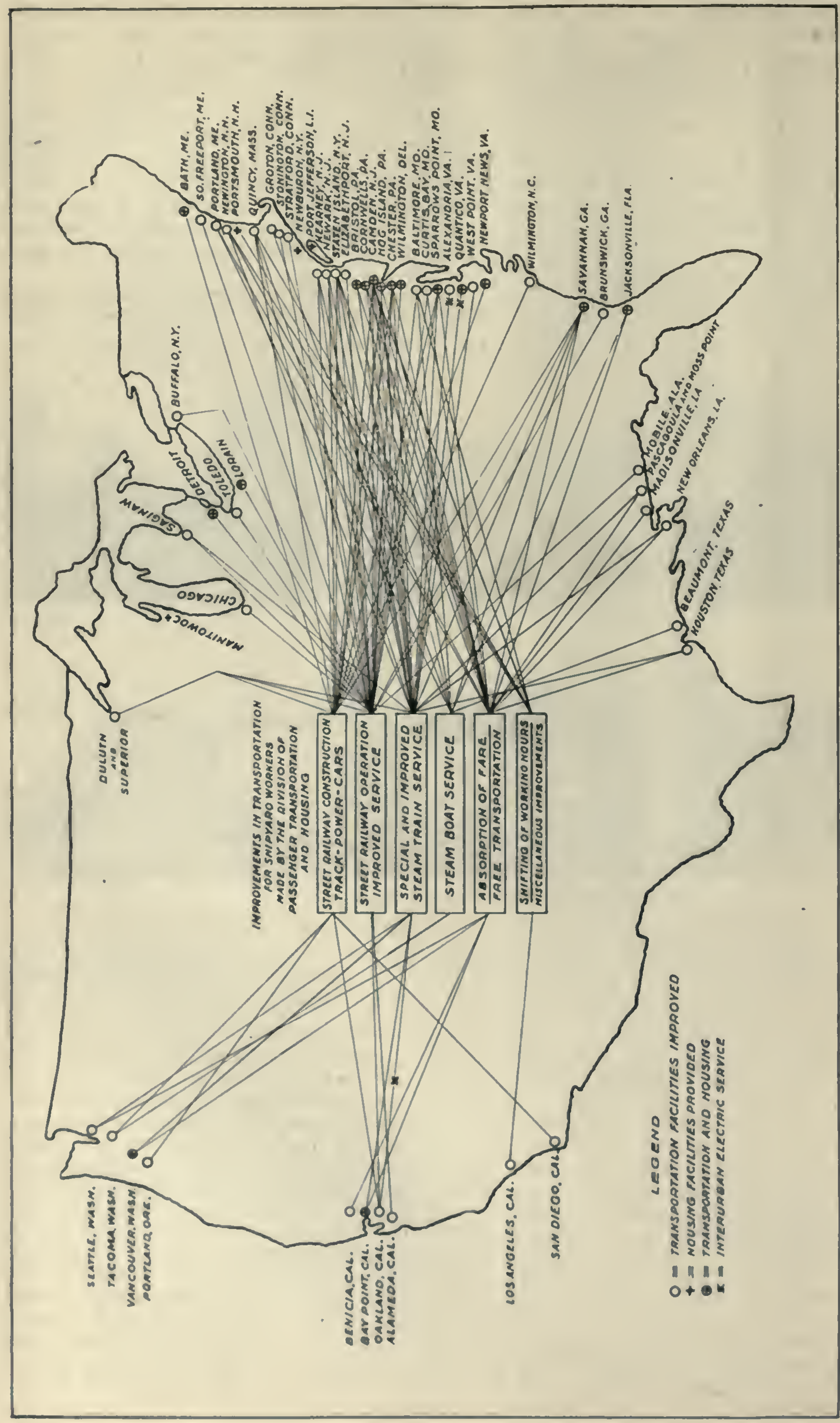
Fig. 4—Hegewisch extension, on Brandon Avenue, looking north from Brainard Avenue (end of line) at Pressed Street Car Works.

Fig. 5—Columbia Avenue, Winton Avenue and Chicago Avenue, looking north from former stub terminal at Standard Steel Works. Near point where connection is made with Gary Street Railway.

Fig. 6—Hegewisch extension, on Brainard Avenue, looking south from about 125th Street and showing construction through marsh.

In concluding this brief summary of our work I take the opportunity to record the appreciation of the division for the splendid co-operation it has enjoyed from the Navy and War Departments, the United States Railroad Administration, the Emergency Fleet Corporation, and other governmental agencies and to the American Electric Railway Association War Board. Special credit is due to Mr. Eidlitz, president of the corporation, and to J. P. Clark and A. L. Drum, consulting engineers to the division. Mr. Eidlitz has been in the closest possible touch with the Department of Labor, under the auspices of which the corporation has operated. Messrs. Clark and Drum have personally investigated in the field the propositions made by the electric railways and have furnished sound engineering counsel in connection therewith.

The General Electric Company, the Westinghouse Electric & Manufacturing Company, Stone & Webster and other commercial concerns have rendered invaluable aid. E. S. Harkness, of the Standard Oil Company, assisted very materially in connection with transportation matters. On the division staff at Washington the manager has been ably assisted by W. A. Mellen, formerly associated with the Capital Traction Company; H. H. Easterly, associated with Mr. Drum; Cabot Stevens, of Stone & Webster; Edward P. Smith, formerly with Harris, Forbes & Company; G. W. Wells, formerly with Stone & Webster; and H. A. Nicholl, general manager Union Traction Company of Indiana. Mr. Smith's financial advice in connection with the making of loans was greatly appreciated. Mr. Nicholl was in charge of the Hampton Roads district. The division also extends its thanks to its loyal office staff for the way in which it assisted in the work done during the past few months.



Map of the United States Showing the Points at Which Improvements for Shipbuilding Workers Have Been Made by the Division of Passenger Transportation and Housing, U. S. Shipping Board, Emergency Fleet Corporation

Electric Railways Help Win the War

How Electric Cars Were Purchased, Electric Roads Extended, Steamboats and Railroad Trains Put in Service and Houses Erected During the War to Stimulate Production at Our Shipyards

BY A. MERRITT TAYLOR
Manager Passenger Transportation and Housing Division, United States Shipping Board Emergency Fleet Corporation

WHEN the United States went to war, enemy submarines were rapidly destroying the world's mercantile marine, and it was at once apparent that the winning of the war was largely dependent upon the building of ships in which to transport our men, munitions and supplies to the European battlefields.

The United States Shipping Board Emergency Fleet Corporation was established by Congress and endowed with the authority and funds to build the ships. Great shipyards were established; others were enlarged. Our problem was to get men to the shipyards to build the ships.

Many of the 203 shipyards on the Atlantic, Pacific, Gulf and Great Lakes were located in districts already congested by other war activities; others were of necessity located in districts which lacked the necessary local labor to build the ships.

In order to abate the labor deficiency in these yards, the United States Shipping Board Emergency Fleet Corporation established the Department of Housing and the Department of Passenger Transportation. It was soon found that the activities of these two departments were so closely related that they could function best as one; consequently, on May 7, 1918, they were merged by the formation of the Division of Passenger Transportation and Housing.

A. MERRITT TAYLOR

Mr. Taylor, previous to his connection with the Emergency Fleet Corporation, was best known for his work as transit commissioner, and later as director of city transit, of Philadelphia, Pa. After serving an apprenticeship as a boy in the machine shops of Wm. Sellers & Company, in Philadelphia, he became interested in investment securities, and in the development of transportation properties. In this field he was very successful and he still retains the presidency of the Philadelphia & Westchester Traction Company, to which he was elected when but twenty-four years of age.

HOW THE DIVISION WAS ORGANIZED

Experienced and able transportation men, engineers, architects, builders and others were called and patriotically entered the service of their country in this division. Many of them made great personal sacrifices which have been fully justified by the results of their efforts under the able leadership of the two assistant managers of the division, Garrett T. Seely, normally assistant general manager of the Chicago Elevated Railroads, who has been in charge of the Transportation Department, and J. Willison Smith, normally vice-president of the Land Title & Trust Company, who has been in charge of the Housing Department; and I have record that a part of the success of our undertaking has been due to the exceptional executive ability and indomitable energy of these two men.

Our other associates, many of them leaders in their professions, possessed of rare executive ability, have each and every one of them contributed in a large way in securing the required results, and I shall always be proud of having been associated with such a splendid coterie of patriotic citizens.

A quick survey developed the present and prospective labor deficiency in each shipyard which was resultant from lack of available housing facilities. All existing housing facilities which were found to be unavailable, owing to lack of proper and necessary transportation facilities, were promptly made available by co-operation between the Fleet Corporation and the transportation companies, in financing the construction of required extensions and by enlarging existing facilities, also by the establishment of additional or new transportation facilities.

A separate appropriation of $20,000,000 was made by Congress for the construction of transportation facilities, and of this amount approximately $12,000,000 was utilized, the greater part of which is adequately secured and will be returned to the United States Treasury with interest at 5 per cent.

Our policy has been to encourage, help and require transportation companies to improve their existing facilities and methods of operation with a minimum capital expenditure, and thus to increase the capacity of their existing facilities to transport the additional traffic with a minimum increase in operating costs and fixed charges; also to bring about co-operation of industrial plants in staggering hours whereby the capacity of transportation lines to serve such plants has been increased twofold over night.

THE WAR WORK DONE

The general results obtained are illustrated by two accompanying charts. One illustrates the progress and results of the activities of the division in locating and relieving transportation deficiencies with relation to the total dead-weight tonnage program of ship production by the Emergency Fleet Corporation in the United States. The other illustrates the locations at which transportation facilities have been improved, the general character of the improvements, and the locations at which housing projects have been established.

The principal enlargements and extensions of transportation facilities consisted of the following:

The purchase of 320 new street cars and thirty-five second-hand street cars was financed for the service of seventeen shipyards.

Street railway extensions were either built or financed for the service of eleven shipyards.

Track changes and loops were financed for sixteen shipyards.

Enlargement of railway power-plant facilities was financed for seventeen shipyards.

Thirty steamboats were placed in service for twenty shipyards.

Sixty special steam railroad trains were placed in service for twenty-six shipyards.

Street railway schedules were improved for forty shipyards.

Working hours were staggered at ten shipyards.

Steam railroad schedules were improved for twelve shipyards.

Over 125,000 shipyard employees are now being transported by the additional transportation facilities thus established.

Through the generous co-operation of electric railway companies, 57,000 additional shipyard workers were being conveyed over their lines to the shipyards on the day when the armistice was signed.

The co-operation which has been accorded the government by the electric railway industry and by all electric railway executives through the Division of Passenger Transportation and Housing of the Fleet Corporation has been, without exception, most patriotic and efficient.

It is with pride and much gratitude that I am able to point out to our industry the important part which it has had in thus expediting ship production and in bringing the war to an early termination.

After exhausting all existing housing facilities which could well be made available by transportation service, many shipyards were still unable to secure the men required to build the ships because there was no place for them to live within access of such yards; therefore, a quick resurvey was made which determined the number of additional men required for the production of ships at such yards and the extent of the delay in ship production in such yards, resultant from inadequate housing facilities.

The number and character of the houses which were then required to abate the deficiency were determined and they were promptly built. They included: 8949 substantial individual houses; 1119 substantial apartments; nineteen dormitories; eight substantial hotels.

The foregoing projects have capacity to house 27,732 shipyard workers or 55,324 individuals, and include necessary stores therefor.

The allotments for these projects aggregate $65,883,845.

Substantially all of the aforesaid buildings are in advanced stages of construction or completed. More than 3800 of them are entirely completed with a capacity to house approximately 12,200 shipyard workers.

Although possessed of plenary powers, the Fleet Corporation in dealing with transportation problems has regarded and protected the rights of transportation companies throughout the great emergency which called for instant action.

Public officials, street railway executives and the public were brought together and shown what was their duty to each other and to their government, and a better understanding has thus been gained of the respective rights of electric railways, of municipalities and of the public, and of their respective duties to one another which should be of lasting benefit to all of them.

A BETTER UNDERSTANDING HAD OF PUBLIC UTILITY CONDITIONS

The public generally has, during the war, come to understand that the financial necessities of electric railways must be met or the traveling public must suffer from inefficient service, also that electric railways are just as essential to the body politic as the circulatory system is to the body human; hence the body politic is not going to permit the electric railways to be paralyzed by misguided public officials or by those who through ulterior motives, lambast vested interests. I predict that the time is at hand when those who persist in these nefarious practices will be branded as public enemies and driven out of public life by an enlightened and incensed public.

The war has taught the American people the value of co-operation and what it accomplishes.

Now is the time for all public utility companies to recognize the necessity of co-operation between them and their customers. When this co-operation is developed through the establishment of mutual confidence, which must be brought about through frankness and a complete understanding of the respective rights, duties and necessities of each, there will be no apprehension or injustice on the part of the public, public officials or the management of electric railways.

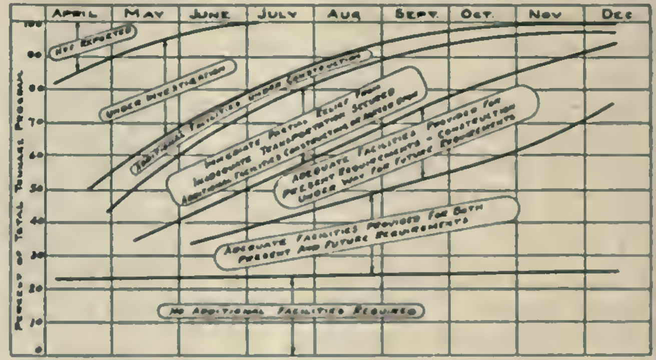


CHART SHOWING PROGRESS OF ACTIVITIES OF DIVISION IN RELIEVING TRANSPORTATION DEFICIENCIES. PLOTTED IN PERCENTAGE OF TOTAL TONNAGE PROGRAM

Twenty years of study and consideration of the problems affecting public utilities, made during various periods in the interest of the United States and municipalities on the one hand and public utility companies on the other hand, and extended investigations made during the war in many localities along our Atlantic and Pacific seaboards and on the shores of the Gulf and Great Lakes, have led me to these happy conclusions.

Among electric railway executives the constructive optimist is to-day the best asset of our industry, and the destructive pessimist is the heaviest burden which it has to carry.

Recent Developments in Service-at-Cost Franchises for Utilities

The Principal Provisions of the Various Service-at-Cost Franchises of Electric Railway Companies Are Described with Great Care and Compared as to Results—The Author Then Draws Conclusions as to the Most Desirable Forms of a Service-at-Cost Franchise

BY L. R. NASH
Stone & Webster, Boston, Mass.

THE year 1918 witnessed a noteworthy development in railway franchises, in which the fundamental feature is the rendering of service at actual cost. Franchises of this kind are not new in the United States, their use covering a period of more than ten years, but until quite recently their number has been very small and the results of their operation not wholly satisfactory. The new franchises drawn during the past year have attempted to cure the defects which have developed from experience with the earlier models and are of further interest through their reflection of the changes in economic thought applicable to public utilities.

L. R. NASH

Mr. Nash has been connected with Stone & Webster for the past twenty-three years. He entered through the engineering department and has been both a constructing engineer and utility manager, but latterly he has been devoting most of his time to public relations and to appraisal and rate cases and has engaged in work of this kind for more than thirty public utility properties in different parts of the United States and Canada. He has also lectured on his specialties at the Massachusetts Institute of Technology and Harvard University, from both of which he has received degrees.

Further attention to this subject has doubtless been stimulated recently by the serious financial difficulties which have befallen the electric railway industry since the civilized world took up its sword in defense of justice and freedom. As a rule the railways have found a 5-cent fare insufficient to cover war-time costs of service and have attempted to secure higher rates. Many of them operated under long-term franchises limiting fares to the established, conventional rate, which presumably held promise of profit when originally adopted. Rapid extensions and improvement of service, transfer privileges and other concessions have kept pace with or outstripped natural increases in business and efficiency to such an extent that the present crisis has been encountered with entirely inadequate reserves.

While many municipalities have unwisely insisted that franchise fare limitations must be strictly observed regardless of consequences, others with breadth of vision have recognized unprecedented conditions and the essential part that transportation plays in our civic and national activities. Some of these latter cities have also taken the precaution to go beyond the bare necessities of a present fare increase and have limited the increase to the period of abnormal conditions. A few of them have gone further and provided that the subsequent reduction shall be proportional to the change in conditions; in other words, they have prepared new franchises embodying the service-at-cost principle.

Within a period of a little more than a year agreements have been reached between municipalities and electric railways with respect to service-at-cost franchises in the following large American cities: Dallas, Tex.; Philadelphia, Pa.; Montreal, Que.; Chicago, Ill., and Cincinnati, Ohio. The service-at-cost principle has been applied by legislative acts to the Boston Elevated Railway and the Bay State system and made available to all other street railways in Massachusetts. Negotiations looking to its adoption have been in progress in other widely scattered communities, notably St. Louis and the Twin Cities. Cities in which similar franchises have been in use for longer periods include the following: Chicago, Ill. (surface lines); Cleveland, Ohio; Des Moines, Iowa; Kansas City, Mo.

Not all these so-called service-at-cost franchises provide, strictly speaking, for the base cost of the service and no more in the prescribed revenue. Some of them embody the sliding scale of rates and return in use by the Boston Consolidated Gas Company and, more extensively, in England, but in a comparatively restricted way. Others provide for a distribution of profits between city and railway. Where the city is required to use its proportion for improvements, extension or ultimate purchase of the railway, service-at-cost still obtains in the long run, although present patrons help to pay the cost of future service. Where the city is not restricted in the use of its proportion of the profits or imposes a special rental or franchise tax, the principle in question is departed from and the prescribed fares cover service-at-cost plus an abnormal part of the city's administrative expenses.

The need of increased fare has not as yet been the primary motive behind the negotiation of most of these franchises, but rather the impending expiration of old grants or the requirements of reorganization, but the example set in Massachusetts, where additional revenue was practically the sole object of the service-at-cost legislation, will doubtless be followed in other communities in the near future.

It is the purpose of this discussion to set forth and compare the distinctive features of the various franchises referred to above, to indicate those features which have found general or recent favor, and to criticise those which are illogical or economically unsound, to the end that an interested reader may assemble such features as appeal to him as the foundation of a model service-at-cost franchise.

Inasmuch as many important features of these various franchises were influenced or controlled by past franchise history and other local conditions, a brief statement of each local situation may throw some light upon the comments on franchise features which follow.

SOME PIONEER SERVICE-AT-COST FRANCHISES DESCRIBED

The Chicago franchises, granted in 1907 in substantially identical general terms to the two principal surface railways serving the city, were renewals of sundry old grants, some of which had already expired, and others were nearing expiration. Extended exploitation of some of these old franchises and alleged exorbitant profits therefrom impelled the city to devise certain safeguards against future similar possibilities. The result, reached after long controversy and exhaustive study, was our first noteworthy franchise of the service-at-cost form. The two principal railways, with subsidiaries, were later combined for operating purposes into a unified surface system.

The acquisition of the Chicago elevated lines by the same ownership and the necessary future association therewith of the comprehensive system of subways projected by the city, led logically to the drafting of a new consolidated franchise covering the existing local transportation facilities and the leasing of the subways to be built and owned by the city. This franchise, which had the indorsement of the business interests of the city, was passed by the City Council in August, 1918, but was rejected at a referendum on Nov. 5, 1918, the opposition being led by certain political and labor elements. The city retained Walter L. Fisher as special counsel in connection with the extended negotiations, he having also served in the drafting of the 1907 franchises. Because the consolidated franchise draft embodies so many features which will doubtless have a place in future franchise negotiations, it has been included in this discussion to the same extent as if it had become effective.

The second franchise of this class, granted in 1909 to the Cleveland Railway in renewal of expired and expiring grants, conforms more nearly to modern service-at-cost standards. It was the outcome of years of bitter struggle, unparalleled in the street railway history of this country, involving receivership, municipal competition, demoralization of service and wreckage of physical property, in which Tom L. Johnson played a dominant part.

In 1914, Kansas City, Mo., granted a new franchise to the Kansas City Railways, organized to succeed the Metropolitan Street Railway then in the hands of receivers. Reorganization and other necessary formalities delayed the putting into effect of this franchise until Feb. 15, 1916, when the Kansas City Railways began operation. A substantial portion of its provisions became effective, however, immediately after its passage on July 7, 1914, and continued in effect throughout the receivership. The primary motive in granting the new franchise was to secure much-needed extensions and improvements which the company was unable to finance under the old franchise, which had only a few more years to run.

The Des Moines (Iowa) City Railway started operations under its new franchise on Jan. 1, 1916. Its old franchises had expired and negotiations looking to renewals had been carried on with the city covering a period of ten years. Progress had been unsatisfactory and receivership followed. Finally the court fixed a period of two years within which the city and company must come to an agreement, failing which the city would be deprived of street car service and the company would be required to remove its property from the streets. The agreement herein referred to was accordingly made. It lacks some of the modern features but still has others of interest.

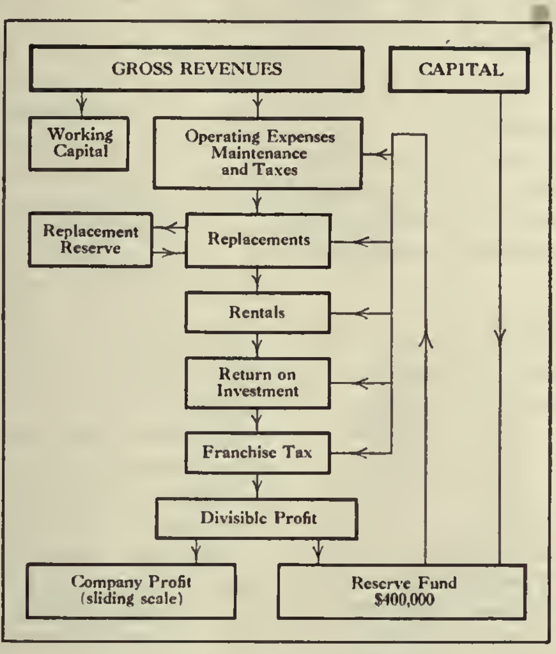
In 1916 Dallas, Tex., passed a new franchise which became effective on Oct. 1 of the following year. It provides for the consolidation of three existing local companies into the Dallas Railways, and the leasing of local lines of another company. It replaced old franchises having only a few years to run under which the logical development of the properties had been retarded.

The new Philadelphia franchise, passed on Jan. 3, 1918, has for its primary object the lease of the city's subway and elevated system by the Rapid Transit Company, and the unified operation of surface and rapid transit lines. It supplements a grant made in 1907 which remains in effect except as modified by the new one. This franchise is now awaiting approval by the Pennsylvania Public Service Commission before becoming effective.

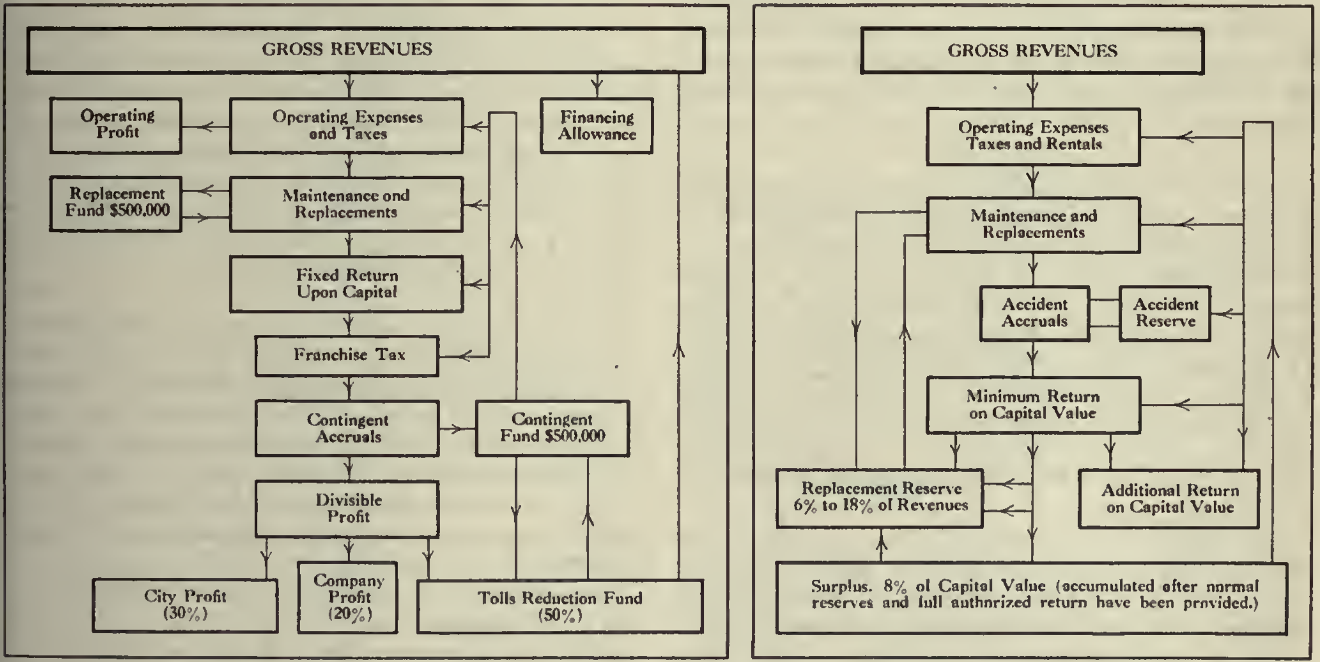
In 1916, the Montreal Tramways found itself in need of additional or extended franchise rights and started negotiations with the city officials for such rights. Opposition developed and finally led to the appointment by the Provincial Government of a commission to investigate the situation and draft a franchise, fair alike to the company and to the communities served. This novel procedure removed the question from the field of local influence and politics, which, in many cases, including one referred to above, have prevented just settlements. The franchise recommended by the commission, with some modification, was approved by the city and accepted by the company on Jan. 28, 1918.

On Aug. 23, 1918, the city of Cincinnati passed an ordinance amending the existing franchise of the Cincinnati Traction Company, granted in 1896 and continuing until 1931, to provide for higher fares and closer regulation. The proceeding was started by a petition from the company asking for permission to increase its fares to compensate in part for war-time increases in cost of labor and materials. The amended franchise, which became effective in September, did not grant an increase immediately but defined the procedure under which it may automatically become effective in the near future.

On May 22, 1918, the Massachusetts Legislature enacted a measure providing for public control of the affairs of the Boston Elevated Railway for a period of not less than ten years. The sole object of this act was to effect financial and physical rehabilitation of the system, and to this end a 5-cent fare limitation in the company's charter was removed. As this charter embodied the company's operating rights not only in Boston but in a large tributary area, the amendment of these rights was logically a matter of State legislation. This act was duly accepted and became effective on July 1, 1918, and promises long-needed relief from the burdens of expanding rapid transit facilities which could no longer be carried by a fixed 5-cent fare. The act provides that if the property is returned to private management it shall not thereafter be subject to public regulation which will deprive it of sufficient income to meet the cost of service, as defined in the act. On June 3, 1918, the Massachusetts Legislature passed a similar measure applicable to the Bay State Street Railway, which serves a large proportion of the urban and rural population of eastern Massachusetts. Its purpose was substantially the same as in the case of the Boston Elevated bill, the Bay State system having for some time been in the hands of a receiver. Management of this property has not yet been taken over by trustees because it has so far been impossible to organize and finance the new operating company contemplated by the act to take over the Bay State property.



Cincinnati Traction Company


GROSS REVENUES
Operating Profit
Operating Expenses and Taxes
Financing Allowance
Replacement Fund $500,000
Maintenance and Replacements
Fixed Return Upon Capital
Franchise Tax
Contingent Accruals
Contingent Fund $500,000
Divisible Profit
City Profit (30%)
Company Profit (20%)
Tolls Reduction Fund (50%)
GROSS REVENUES
Operating Expenses Taxes and Rentals
Maintenance and Replacements
Accident Accruals
Accident Reserve
Minimum Return on Capital Value
Replacement Reserve 6% to 18% of Revenues
Additional Return on Capital Value
Surplus. 8% of Capital Value (accumulated after normal reserves and full authorized return have been provided.)

Montreal Tramways Company

Dallas Railways Company

DIAGRAMS SHOWING DISPOSITION OF ITEMS UNDER SERVICE-AT-COST OPERATION

About the same time the Massachusetts Legislature also enacted a general measure under which any other street railway in the State may voluntarily accept a service-at-cost plan of operation under State supervision. This is further referred to herein as the "Massachusetts act." It has so far not been accepted by any of the railways to which it is applicable, primarily on account of the present difficulty of setting up in advance the required reserve fund. The procedure first embodied in these several Massachusetts measures, of transferring the control of public utilities from private management to trustees representing the public, was the result of a desperate need of action, prompt, far-reaching and fearless, which would be accepted by a critical public with far less protest when coming from their own appointees than from private officials, so often assumed to be under control of financial interests. This review of recent agreements might properly include the so-called "dual subway" contracts under which the new subways in New York will be operated. They are omitted because they are not in general effect, and the division of profits provided for therein does not differ essentially from that in effect or contemplated in other cities whose railway franchises are described.

Passing from this historical review, it is now in order to consider more in detail the distinctive features of the various service-at-cost franchises. With so many elements common to all, the logical procedure is adopted of arranging the description and discussion by elements, with a statement of the peculiar features of each appearing in the different franchises. General provisions, applicable to any form of franchise, are omitted unless they assume special significance in the form under discussion.

Life of Franchise

Most of these franchises do not differ from the older forms in the length of their term, which in many cases is limited by state legislation, other than to provide for earlier termination by municipal purchase as elsewhere described. The Chicago consolidated franchise is of the indeterminate form, as are those in Massachusetts, in accordance with the established practice in that State. The Dallas franchise has a fixed initial term of ten years, after which it continues without limit except for purchase provisions.

TABLE 1—INITIAL CAPITAL VALUE

In Approximate Figures Per Mile of Single Track of Various Service-at-Cost Electric Railways

Chicago (1907)	$92,000
Cleveland	98,000
Kansas City, Mo.	132,000
Des Moines	54,000
Dallas*	65,000
Montreal	139,000
Cincinnati	138,000

*No power station.

The advantages of unlimited life, in avoiding amortization of investment in excess of adequate provisions for depreciation, and in not discouraging improvements and extensions at any period, are too obvious to need elaboration.

Valuation

Under one name or another all the franchises herein considered embody an amount used as the basis of return to investors. In most cases the same amount, or another derived from it, is established as the price for municipal purchase. The term "capital value," used in some of the franchises, is adopted herein to designate the rate base. With respect to the initial capital value, the different franchises show a wide range as compared with the actual investment or normal cost of reproduction. The approximate initial amount per mile of track is shown for a number of the service-at-cost cities in an accompanying table.

The Chicago, 1907, surface franchises contain capital values fixed by a commission after a careful appraisal of the properties and determination of their physical condition. The values adopted were the "present value" or cost of reproduction less depreciation. There has been frequent criticism of these values, much of it in connection with the recent franchise campaign, as being too liberal. A careful study of the figures does not furnish support for such criticisms. The physical value allowed for the two principal systems was less than 75 per cent of their combined cost of reproduction. The amounts added to the physical values for franchise values and other intangibles, bringing the compromised total up to $50,000,000, were comparatively small. While a considerable proportion of the reconstruction costs during the initial rehabilitation periods was charged to capital value, there is every reason to give credence to the opinion of the Board of Supervising Engineers, Chicago Traction, that "It is doubtful if a large unified traction company exists in this country to-day which contains a greater percentage of actual physical value in its capitalization."

In the recently rejected consolidated franchise, the capital value was fixed as the current capital value of the surface railways plus a value for the elevated lines determined in a manner similar to that originally followed with the surface lines.

The original Cleveland capital value was the subject of extended controversy and is still freely criticised as unfair to the investors in the property. This value was fixed by Judge Tayler, the arbitrator, at slightly more than $24,000,000. After deducting the outstanding indebtedness, there remained for the stockholders a balance amounting to only 55 per cent of the par value of their holdings. The outstanding stock was surrendered and new certificates were issued for 55 per cent of the original amounts. The 45 per cent of par value thus wiped out amounted to $10,530,000. The full value of all outstanding securities was only slightly in excess of the undepreciated value fixed in the appraisal, which was the basis of Judge Tayler's determination. There was no evidence to show that the property had in the past earned a depreciation reserve or a fair return to investors. Without such evidence there is no economic justification for depreciation of value. No going value element was included.

The Kansas City capital value was determined from an appraisal made in 1912. While the full cost of reproduction was not allowed, the depreciation was more than offset by intangible elements. The very thorough study made in this case of early deficits, franchise values, actual investment, market values and other pertinent elements, is worthy of very careful study in connection with future franchise settlements. Further reference will be made in this article to the intangible elements amounting to about 25 per cent of the full capital value.

The initial capital value included in the Des Moines franchise, $5,000,000, was the result of compromise after the extended negotiations already referred to, and its relation to actual investment is not known. It was only slightly less than the then outstanding capitalization.

The Dallas value was also the result of compromise but was materially below the usual standards. It was about 80 per cent of the actual investment in the properties, which corresponded quite closely with their cost of reproduction. A large going value or development cost was entirely ignored.

No new values were established in the recent amendments to the Philadelphia Rapid Transit franchise. Actual indebtedness and the par value of the $30,000,000 of capital stock approved in the 1907 franchise plus actual expenditures for new facilities form the basis of the return to investors.

The capital value fixed by the provincial commission for the Montreal franchise was in fairly close agreement with the company's capitalization and is believed to be approximately equal to the cost of reproduction of the property.

The recent amendment to the Cincinnati franchise does not definitely name a complete capital value for rate purposes but does establish a base, determined by appraisal, for a municipal price.

The several Massachusetts railway acts considered herein recognize, as far as capital value is concerned, the long-established custom in that State of basing return and purchase price upon actual cash investment, "honestly and prudently made," without deductions for depreciation or other theoretical factors and without specific reference to the form of securities outstanding. This sane policy, adhered to by the Massachusetts commissions in the face of widely different methods advocated in other states with less complete regulatory experience, has materially increased the stability of public utility investments within their jurisdiction.

Starting with the initial capital values as herein described, a continuous record is kept for purposes of return or purchase, or both. The procedure is in most cases similar. Approved additions to property are included at actual cost or with an arbitrary allowance for certain overhead elements such as supervision, financing, etc. Property lost or retired is similarly deducted from capital value, logically and usually by the amount representing its cost or other value previously included in capital value. In the case of Cleveland, this practice is not followed. If worn out or obsolete elements of property are replaced by new elements, the capital value is increased only by the excess cost of the new elements over the estimated cost of the replaced elements new at the time of replacement.

The property included in the initial capital value was entered at an average of 70 per cent of its then cost of reproduction. If it were withdrawn from time to time at this same depreciated value and replaced by new property at full value, the initial 30 per cent depreciation would ultimately disappear. This possibility has been carefully avoided and the initial depreciation, with whatever injustice to stockholders was involved therein, will always remain, although subsequent stockholders are assured a continuous return upon their full investment. This discriminatory feature is not to be found in full in any other of these modern franchises. In the Dallas franchise, which embodies a similarly depreciated value, this Cleveland provision applies after an initial rehabilitation period of two and one-half years within which a large amount of reconstruction was required, including those elements of the property which had experienced maximum depreciation.

The capital value set up in these franchises includes, or has added to it for rate purposes, an allowance for working capital, including cash, supplies, net current assets, etc. In a few cases a distinct fixed sum or a fixed percentage of gross revenues is established, but more commonly the amount included in the original appraisal, on which the capital value was based, is continued unless or until a larger amount is authorized.

A review of the different bases of capital value used in these franchises shows a preponderance in favor of cost of reproduction or actual investment without deduction for accrued depreciation. Actual investment as a basis for rates has so many obvious and logical advantages as to give it increasing favor in regulatory practice. It would probably have much wider use but for the difficulty of determining it from the records of old properties which may have been through many reorganizations or consolidations. Where the difficulties of determining actual investment are insurmountable, the cost of reproduction gives a suitably close agreement with probable investment, and may be used without injustice, particularly if historical prices and conditions are applied. Neither actual investment nor cost of reproduction should be diminished for depreciation unless a careful study of the entire financial history of the property shows that the investors therein have taken such a large average return from the property as clearly to justify the opinion that a part thereof was in effect amortization of investment. If the investors have received no more than a fair return and the property has had reasonable provision for its upkeep, there is no economic justification for a depreciated value.

SUPERVISION

Control of operation, construction and financing by city or state authorities is embodied in all service-at-cost franchises. It is usually in the administrative hands of a local supervisor or board responsible to the municipal governing body. The term "supervisor" is generally used herein to designate one or more persons occupying this office.

A single supervisor is provided in Cleveland, Dallas and Cincinnati, acting in each case as a representative of the City Council with limited personal authority or responsibility.

Boards of two supervisors representing city and railway respectively, with provision for a temporary or premanent third member as arbitrator, are found in Kansas City, Des Moines and Philadelphia. The railway members are presumably regular officials of the companies. A permanent board of three members, appointed for a term of ten years or good behavior by a provincial official, serves in Montreal, with no direct responsibility to the city administration.

In certain cases, particularly Philadelphia and Montreal, appeal from a decision of the supervising board may be taken to the public service commission of the State or Province. In fact, the Montreal board may be called a local agent of the Quebec Public Utilities Commission, which retains general jurisdiction and may intervene as in other localities. The results of this relationship should be of interest and offers a possible compromise solution of the frequent demand for "home rule" in utility regulation.

The Chicago consolidated franchise and the Boston Elevated and Bay State acts embody the new principle of public administration of private property. The Massachusetts trustees, five in number in each case, are appointed for ten-year terms by the Governor and have very broad administrative powers entirely independent of public service commissions and local authorities. The Chicago trustees, nine in number, who are in reality to be directors of a new holding company not for profit, serve for overlapping three-year terms. The original board was selected by agreement but ultimately the appointing power lies in the city of Chicago. It is contemplated that a comparatively small executive committee will have direct charge of administrative affairs of the surface, elevated and subway lines.

The trustee principle is a compromise between regulated private operation and complete municipal ownership. It promotes that confidence with persistently attaches itself to public operations, but avoids the proverbial inefficiency of such operations and the subjection of new bodies of voters to political control. Where confidence already exists in the public utilities or their regulatory commissions, public trustees would serve no necessary purpose. Where it does not exist, temporary public operation such as is provided in the Massachusetts acts, may serve to restore it and permit subsequent satisfactory service under restored private operation.

As far as the usual local supervision is concerned, the success so far attained with a single official would indicate that an independent, larger board is not required except in quite large cities, provided the appointment is free from political influences. It is suggested that the appointment or nomination of such an official might well be made by the state utilities commission. This would tend to insure the needed technical training and promote harmony between city and state in the regulation of the utilities affected. The local supervisor may well serve as an agent of the utilities commission in matters over which it retains jurisdiction, relieving the commission of many local details and allaying opposition to state regulation. A board of trustees as large as that contemplated in the Chicago consolidated franchise is too large for effectiveness unless its active duties and responsibilities are assigned to a comparatively small executive committee.

THE trustee principle is a compromise between regulated private operation and complete municipal ownership. It promotes that confidence which persistently attaches itself to public operations, but avoids the proverbial inefficiency of such operations and the subjection of new bodies of voters to political control. Where confidence already exists in the public utilities or their regulatory commissions, public trustees would serve no necessary purpose. Where it does not exist, temporary public operation such as is provided in the Massachusetts acts, may serve to restore it and permit subsequent satisfactory service under restored private operation.

FRANCHISE TAXES

A special tax upon municipal franchises may be considered as a payment for special, exclusive rights to conduct a profitable business, or as a charge for the location of fixtures upon public property. As far as electric railways are concerned, such taxes have usually taken the form of a fixed fee per year per mile of track, per car operated, or per pole erected upon public streets, or a percentage of gross earnings, or a lump sum to cover one or more of these elements.

In the old days when the street car business was, or was supposed to be, a profitable unregulated undertaking at the conventional 5-cent fare, any amount which municipal authorities could extract from this business lessened the burdens of taxation on other property without offsetting disadvantages other than a possible, minor impairment of service.

In these present days of regulated public service, all tax burdens are included in the cost of the service which the patrons are expected to pay. Regulation has not always accomplished its intended purpose, and charges for service may remain higher or lower than actual cost. This, however, is not true under service-at-cost franchises. Any inequitable taxes imposed upon electric railways under service-at-cost operation transfers to their patrons, through higher fares or poorer service, burdens which the community as a whole should carry. To the extent that the patrons of the railways are not well-to-do or property owners, the injustice to them in such taxation is multiplied.

This fact is recognized in most of the service-at-cost franchises as far as direct taxation is concerned. In two of them, however, a direct franchise tax or "rental" is imposed. In Montreal, the tramways company pays the city a rental of $500,000 per year, or about 6 per cent of its present gross revenue. In Cincinnati, the traction company pays a "tax on gross earnings" or $350,000 per year, or about 8 per cent of revenue.

With respect to indirect burdens which may be considered as a form of taxation, such as street paving, cleaning, sprinkling, etc., most of the service-at-cost franchises do not differ essentially from the older forms. Logically, there is no excuse for continuing such practice. Since the passing of the horse cars, the operation of the street railways has imposed no material additional burdens upon pavements, but they have continued to pay a large proportion of the cost. Hundreds of miles of streets have been paved solely because of the car tracks therein, and the street car revenues have been steadily decreased by the resulting encouragement to vehicular traffic.

Some recognition has been given to this thought in several of the franchises under discussion. In Montreal and Cleveland, the railways do not pay for new paving but do pay their proportion of maintenance. In the new Chicago franchise the usual paving, repaving, cleaning and sprinkling requirements are included, but the cleaning and sprinkling part must be omitted if at any time a deficit has been created and an increase in fare would otherwise be necessary.

A model service-at-cost franchise should entirely omit all such special taxes and street maintenance except any actual repairs or cleaning incident to car operation.

PUBLIC CONTRIBUTIONS

The State of Massachusetts, always a pioneer in public regulation, has gone one step further than the relief from special taxation discussed in the preceding section. It has provided in the Boston Elevated and Bay State acts and a separate act applicable to other street railways, that cities and towns may contribute through taxation toward the operating costs of street railways which serve them. In the case of the Boston Elevated, this relief is intended to be temporary, the advances to be refunded if possible from surplus subsequently accumulated through higher fares or more successful operation. There is, however, no specific obligation in the act to make such refund.

In the case of other railways the contributions may be made permanent, in lieu of higher fares, or to prevent curtailment or abandonment of service otherwise necessary. These contributions are limited to 50 cents per $1,000 of valuation in cities and $1 per $1,000 in towns and are made under terms and conditions approved by the utilities commission. Several communities have taken advantage of this act within the last few weeks to retain service which would otherwise have been discontinued. While this relief is limited to the period of the war and two years after its official termination, it indicates a very definite change in the public attitude toward the electric railway industry. Instead of its being considered a profitable private monopoly to be taxed as far as possible for the support of the state, it is being regarded as a public institution which must be maintained, through taxation if necessary.

The Philadelphia franchise contains an interesting provision having the same effect as aid through taxation. In connection with the rental to the railway of the city's rapid transit system on a percentage-of-cost basis, the city, to avoid or minimize an otherwise necessary fare increase, may withdraw from rental requirements any or all of its transit facilities used by the railway and collect the interest and sinking fund charges thereon through general taxation. This is in addition to the prescribed practice of caring for such charges on new sections of the rapid transit system through general taxation for one year after they begin to operate.

The Bay State act provides that, during the war and for two years thereafter, the railway shall not be required to pay for any paving, or other street or bridge improvements or repairs, abolition of grade crossings, putting wires underground, or other non-esential work. So far as such work continues to be done, direct taxation therefor is increased to relieve the railway.

The policies outlined are in marked contrast to those prevailing in Montreal and Cincinnati, where the cities not only exact a large franchise tax but also take a larger share of the surplus than goes to the railways.

FARE SCHEDULES

The kind of charges that may be made to cover the cost of service are defined in most of the service-at-cost grants but not in all. There is a tendency in recent grants to allow more latitude in this direction to the supervising authority. The first franchise to lay down a specific schedule of fares, from one step of which to another the fares would go up or down with increased or decreased cost, was the Tayler grant in Cleveland. The ten steps in this schedule, starting with a 2-cent fare, did not contemplate that it would ever be necessary to go as high as 5 cents in Cleveland, the highest authorized rate being 4 cents cash, or seven tickets for 25 cents, plus 1 cent for transfers. The steps were intended to vary from each other by about 10 per cent, but changes in routing and transfer requirements upset the symmetry of the schedule so that certain steps became practically useless. It was necessary in 1918, partly on account of war-time costs, to amend this franchise to increase the upper limit of fares by adding five new steps, the one now in effect being 5 cents plus 1 cent for transfers. The maximum new step is 6 cents, nine tickets for 50 cents, 1 cent for transfers.

The Dallas fare schedule is simpler, with a uniform cash fare of 5 cents with free transfers, but with tickets at twenty-two, twenty-four, twenty-eight and thirty-two for $1 respectively in the four specified steps (sold in 25-cent lots where divisible by four).

The Cincinnati schedule includes only three specific steps, 5, 5½ and 6 cents respectively, but provides for as many others, up or down at ½ cent intervals, as may be required.

No other franchises of this class include a specific range of fares, but the Boston and Bay State acts provide that the trustees shall prepare and publish fare schedules with steps above and below that in effect, all such schedules to be subject to revision at the will of the trustees. The Chicago surface, Kansas City and Des Moines grants fix the standard fare at 5 cents. The Kansas City, Mo., fare has recently been increased to 6 cents by order of the Missouri commission. The Chicago consolidated franchise fixes the initial fare at 5 cents (or such other rate as may be in use when it becomes effective) and provides for a transfer charge of not more than 2 cents, between rapid transit and surface lines only, for further increases in costs of service. If this should prove insufficient, an increase in base fare is permissible without limit, although not very clearly so stated in the draft. The Des Moines City Council recently denied a petition for a 6-cent fare, claiming that it had no legal authority to do otherwise. A receivership for the railway promptly followed.

> ACTUAL investment as a basis for rates has so many obvious and logical advantages as to give it increasing favor in regulatory practice. It would probably have much wider use but for the difficulty of determining it from the records of old properties which may have been through many reorganizations or consolidations. Where the difficulties of determining actual investment are insurmountable, the cost of reproduction, using historical prices and conditions, gives a suitably close agreement with probable investment, and it may be used without injustice. Neither actual investment nor cost of reproduction should be diminished for depreciation unless a careful study of the entire financial history of the property shows that the investors therein have taken such a large average return from the property as clearly to justify the opinion that a part thereof was in effect amortization of investment. If the investors have received no more than a fair return and the property has had reasonable provision for its upkeep, there is no economic justification for a depreciated value.

All the above franchises, and also the one in Montreal, provide for uniform fares within the city limits other than for possible charges for transfers. Such limitation is not imposed in Philadelphia, Boston or the Bay State territory. Philadelphia fare changes are restricted only by the supervisory power of the utilities commission. Boston and Bay State fares may be fixed by the trustees without any such supervision. This territorial restriction in Montreal is the only one in this last group of cities bearing upon the character of fare revisions. The extent of the revisions at any one time is, however, restricted in some cases, particularly with respect to reductions. In Philadelphia, a downward revision is not permitted unless two successive years show substantial increases in surplus, and then the estimated annual loss in gross revenue from the reduction must not exceed one-third of the accumulated surplus. Revisions upward must be sufficient to make up losses "within a reasonable time."

The changes contemplated in the general Massachusetts act are exceedingly small per step, each being intended to be not more than 30 per cent of a reserve fund, which in turn is between 6 per cent and 12 per cent of the normal gross revenue. It is not clear how such small changes would be workable.

The Montreal provisions for fare changes are interesting, more from the point of view of extreme refinement than from their practical advantages. For example, fares may be decreased when a fund for their equalization reaches $1,000,000 and must be decreased when it reaches $2,500,000. When a decrease is made, the resulting lower revenues are supplemented by an appropriation from the fund of not more than 25 per cent of the accumulation therein. The estimated annual gross loss in revenue from the reduction must be greater than this percentage appropriation from the fund, but not greater than this percentage plus 37½ per cent of the additions which flowed into the fund during the preceding year from "divisible surplus." This appropriation from the fund to augment current revenues is continued annually until the balance remaining therein is less than the annual appropriation. No similar proceeding is possible in connection with fare increases. They must directly yield enough to make good accumulated losses. It is clear that, by the complicated safeguards surrounding fare reductions in Montreal, they must be kept within safe limits, determined by past profitableness of the business, but it is yet to be demonstrated that suitable care is not assured by the simpler requirements in other franchises.

The two boards of trustees authorized in Massachusetts to administer the Boston Elevated and Bay State systems furnished the only illustrations of unrestricted freedom in the method of raising or lowering fares other than for the directions given in the act. If this arrangement proves successful, it will indicate the desirability of further simplification in this respect in future franchises.

Limited actual experience up to this time does not show any advantage in fare schedules definitely fixed in the franchise. The Cleveland schedule has failed as to both range and relation between steps. There is, however, advantage in having fixed at all times at least one step above and below the one in effect ready for use without delay, and the general principles embodied in the various scheduled steps should be clearly established and published. The supervisor should, however, have authority to change both the schedules and the basis upon which they are designed, possibly after public hearings and approval of the utilities commission. Only by such latitude can conditions like the present be promptly and satisfactorily met. Under normal conditions fare changes should be neither frequent nor violent, indicating the advisability of fairly wide limits in a liberal "barometer" fund.

COST OF SERVICE

This is the central feature of all the franchises under consideration, the one which requires the most careful scrutiny. There is naturally a material difference among these franchises in their definitions of cost. The difference may be quite large in some of the elements, but when all these elements and their definitions are put together, the differences are found largely to offset each other so that the conceptions of total cost are reasonably consistent in most cases.

The significant elements of cost, as set forth in some or all of the various franchises, are stated in the following schedule:

1. Expenses of operation.
2. Maintenance and replacements.
3. Taxes.
4. Rental.
5. Return on capital value.
6. Amortization.
7. Surplus and reserves.

An attempt has been made to state these elements in the order of their importance or priorities. The latter exist even in cumulative form in some cases. A fundamental difference between the various franchises in this group is that some definitely limit or fix the important elements of cost, while others leave the matter very largely to the judgment of the supervisor. Definiteness is found most uniformly in the return to investors, but even here the rate of return is subject to variation in the majority of cases. The method of treating the various cost elements in the several franchises is explained in the following paragraphs:

1. Expenses of Operation

The Cleveland grant is the only one which imposes a strict and definite limit on operating expenses. The amount per car-mile which may be spent is fixed in the original franchise, and it may not be exceeded or changed without action of the City Council. If actual expenses are greater than the allowance, as has commonly been the case, the excess comes out of the company's pocket unless or until it has been validated. If the company runs under its operating allowance at any time, it may not retain the balance as a reserve to offset overruns but must turn it back at the end of the year. The company has habitually kept accounts of both its actual and allowed expenses and has at times accumulated an overrun of hundreds of thousands of dollars before validation, the allowance being very often too low. This arrangement obviously lacks flexibility, and the responsibility for adjustments rests with a large body of city officials not well acquainted with operating requirements and sometimes influenced by political motives. The initial Cleveland allowance for expenses, exclusive of maintenance, was 11½ cents per "ordinance" car-mile. This has been increased from time to time and is now 19½ cents.

The Montreal franchise has a somewhat similar operating expense allowance on a car-mile basis, but it is fixed annually in advance by the supervisor in the light of recent experience and any anticipated changes in operating conditions. If the allowance is exceeded, due to unforeseen developments for which the railway is not responsible, the excess must be approved by the supervisor. Any excess for which the railway cannot give acceptable explanation must be made up from its own resources. A standard of traffic density is determined in connection with the expense allowance for closer definition. There is no obvious reason why this arrangement should not guard fully against extravagance, incompetency or other derelictions which it seeks to prevent.

In Cincinnati the railway must annually, in advance, prepare a detail expense budget and submit it to the supervisor for approval. With any necessary modifications agreed upon or fixed by arbitration, the budget becomes the basis of the year's operations. It may not be exceeded wholly or in any part without approval of the supervisor.

None of the other franchises in this group has any such definite provisions for avoiding excessive expenses. Presumably they all contemplate such close supervision of operations and scrutiny of reports thereof that any improper practices or tendencies would be at once detected and corrected. It would seem reasonable to concur in this majority opinion, at least until such defects develop in the practical workings of the simpler procedure as would justify the added complications and cost of the other.

2. Maintenance and Replacements

A larger number of these franchises have more specific requirements with respect to maintenance and replacements. Here, in contrast with current operating expenses, the intent is to insure adequacy rather than close adjustment to actual current requirements. To that end the maintenance and replacement account is made a continuing one from year to year, any unused appropriations being carried to a reserve.

On account of the difficulty of definitely distinguishing between current maintenance and renewals or replacements and also because of their interrelation, the two have in most cases been combined in franchise provisions relating thereto. The Chicago franchises furnish the only exceptions among those discussed. The consolidated draft follows the example of the 1907 surface grant in requiring a minimum annual expenditure or reserve for maintenance of 6 per cent of the gross revenues, and a corresponding 8 per cent for replacements or 14 per cent minimum total for total upkeep. Either or both percentages may be increased at will by the trustees, but no specific reserve is required as a condition of a fare reduction or otherwise.

The Cleveland franchise includes a combined maintenance and replacement allowance. It is on a car-mile basis, varying in different months of the year and averaging about 4.9 cents. Any amount not currently spent is credited to a reserve, but no accumulation has been possible. On the contrary, the allowance has proved so inadequate that in spite of numerous special appropriations and prorates, a deficit of more than $2,600,000 was recently reported. Clearly, this allowance should have been increased years ago, as was the operating allowance, but allowances when once increased by ordinance are not easily reduced again. In August, 1918, the City Council granted an increase in this allowance to 6 cents for the period of the war and six months thereafter.

The Dallas provisions for repairs and replacements are more complicated but are interesting in that they embody ideas not found in any other franchises. A minimum expenditure for repairs and replacements is fixed at 10 per cent of the gross revenues. For each 1 per cent per annum return paid on the capital value in excess of 5 per cent, this 10 per cent minimum is increased by 3 per cent. With the contemplated normal return on the capital value of 7 per cent, the minimum accruals for repairs and replacements become 16 per cent.

After providing in any month for operating expenses, including a suitable accident reserve, taxes, the normal return on the capital value and the corresponding repair and replacement accrual, any balance remaining of current gross revenue must first be applied to increase the said accrual to 18 per cent for the current month and year, and thereafter to make up as far as possible any prior deficiencies in said accruals under 18 per cent.

These accruals are continued as herein described until the excess over actual expenditures accumulates in a reserve to the "normal" amount, after which they are reduced to such amount as will maintain the normal reserve. The normal amount is 6 per cent of the capital value when the fare schedule then in effect includes six tickets for 25 cents; it is 10 per cent of the capital value when seven tickets are sold for 25 cents, etc. This provision embodies in a systematic way the old practice of setting up reserves for depreciation in proportion to the prosperity of the business.

Prosperity is measured in this case by the rate of return on the capital value (fixed by the rate of fare). Starting with a minimum accrual and return of the percentages above stated, both increase together until an adequate reserve is created, and the reserve is made more liberal with increasing rates of return. This arrangement or its equivalent might well be embodied in other franchises, for it is impossible to tell definitely what constitutes an adequate reserve to provide for obsolescence, inadequacy, catastrophes and other indeterminate factors in addition to the more definite wear and decay. A practice that provides for little beyond the definite factors in hard times and liberally for the indeterminate factors in good times, should meet all reasonable requirements.

It might even be argued with force, particularly in the case of service-at-cost, that no advance provision should be made for certain of the indeterminate factors. When an inefficient property element is replaced by an efficient one, or a heavy wooden car by a light, modern, steel car, the cost of the change may well fall upon those who benefit thereby, the future users of the service. In many cases careful calculations would show that no additional burdens are thereby imposed upon these future users because the added charges and amortization would be offset by increased operating efficiencies. If the full burdens of depreciation were thrown on the users of the old facilities, the users of the new facilities would get improved service at reduced cost.

The Montreal franchise provides for a maintenance and renewal charge in operating expenses on a car mileage basis, fixed in advance for each year by the supervisor, sufficient to keep the property permanently in good condition. The current excess over actual expenditures is added to a fund which must be accumulated to a normal amount of $500,000. When this amount has been reached, subsequent charges for maintenance and renewals will be only sufficient to maintain the normal amount. So much of this fund as is not currently needed is invested in additions to the property or otherwise, and the interest thereon is added to the fund.

None of the other franchises in this group has specific charges or accumulations for these purposes. It is in all cases intended that the supervisors shall see that the properties are adequately maintained at all times. In the case of Cincinnati, the city or company may call upon the State Utilities Commission to prescribe suitable depreciation reserves. The advantages of freedom from rigid provisions for uncertain requirements are obvious. Under service-at-cost franchises, there is no question of diverting needed replacement funds to pay excessive dividends. Returns to investors are definite and there is no possibility of diversion. The problem of reserves for replacements involves theoretically the amount of destruction of capital incident to the unit use of the property. If this is currently overestimated, present patrons pay more and future patrons less than cost.

> ANY inequitable taxes imposed upon electric railways under service-at-cost operation transfer to their patrons, through higher fares or poorer service, burdens which the community as a whole should carry. To the extent that the patrons of the railways are not well-to-do or property owners, the injustice to them in such taxation is multiplied.

Under old forms of franchises with fixed rates of fare, the investor is the one who submits to fluctuations in return in case of bad guesses at depreciation. This is not the case with service-at-cost. If the average car rider were better acquainted with the economics of the situation, he might well ask why he should contribute largely to the accumulation of a fund for replacements which will never be used, the interest on which will permit car riders of some future day to pay less than the then current cost of replacements. A moderate reserve is undoubtedly needed. The specifically fixed reserves mentioned, not exceeding 10 per cent of the capital value, are not excessive. A theoretical reserve, amounting to perhaps four times that limit, which might be set up under some of the other franchises, has no practical justification.

3. Taxes

The tax feature of these franchises needs very little further comment. The actual taxes, subject to little control by either railway or supervisor, are a necessary part of the cost of service. It is proper that the city should not impose any illogical tax burdens or permit other taxing authorities to do so. Cleveland has been notably active in this direction, joining with the railway a few years ago in a suit to bring about reduced State taxation of the railway property.

4. Rentals

The leasing of transit facilities from other utilities or from municipalities is not uncommon. When the leased facilities are comparatively unimportant, the rent is included among the operating expenses. Where the leased property is as extensive as that included under several of the service-at-cost franchises, more critical attention is necessary. The Dallas and Cincinnati franchises authorize the railways to include in the cost of service the actual rental in very substantial amounts paid to other railways for use of tracks and other facilities under prior agreements made between the parties at interest. In Chicago and Philadelphia the leasing of city-owned rapid transit facilities is a very important feature of the recent franchise drafts.

The Philadelphia terms are noteworthy for their liberality. The railway undertakes to reimbuse the city for actual interest and sinking fund payments on the city's certified investment in subways, elevated structures and equipment "as and if earned." These rental payments are made from the balance, called "current net revenue," remaining after the gross revenues have provided in full for the following items: (1) operating expenses; (2) taxes; (3) fixed charges on the company's prior obligations; (4) fixed charges and dividends on securities issued pursuant to the new grant for new transit facilities and extensions of the old system; (5) accruals to depreciation reserves for the city's transit facilities, the company's associated transit facilities, and for the balance of the company's system; (6) sundry payments to the city required under the 1907 franchise.

The balance after these six items are taken care of is not all devoted to rental, but is divided between company and city in proportion to respective investments the city's investment being in the leased transit facilities, the company's investment being the capital stock outstanding on its old system, amounting to $30,000,000 (dividends not included in item 3 of prior deductions above). Each party gets not more than 5 per cent on this investment. Out of any balance remaining after this 5 per cent distribution, but not before, the city may be paid any additional amounts needed to meet its full interest and sinking fund charges on its transit facilities. All other disbursements have priority. Furthermore, payments under the first five items of deductions are cumulative and must be paid in full after any period of deficiency, and thereafter the distribution of current net revenue between city and company takes precedence over deferred payments under item 6 and the final rental payments to the city.

Reference has already been made to the option which the city has of withdrawing from certification and rental requirements, any part or all of its transit facilities, so that fares may not be unduly increased thereby. The terms of this Philadelphia lease embody a broad recognition of the principle that a city as a whole may need improved transit facilities which the patrons of the facilities should not pay for in full. The removal of surface railway traffic from the streets is of substantial benefit to many business interests which must still use the streets. Rapid transit definitely enhances suburban real estate values. It is not unfair that some of these interests affected should, temporarily at least, bear a portion of the rapid transit burden. In the case of suburban real estate, an increase in assessed valuation in proportion to the increase in market value, and the application of the resulting increase in taxes or its equivalent to the charges on rapid transit facilities, would materially lessen the increased cost of transit service.

The provisions in the recent Chicago draft, covering the lease of the city's projected subways, do not show the same liberality as found in the Philadelphia lease. The company is required to pay 6 per cent on the new money which the city invests in its subway system, the payment for each section of the system beginning immediately upon its being placed in service. The investment upon which this return is paid naturally does not include the expenditures made from the large fund accumulated from the city's 55 per cent of the net revenues of the surface lines under the 1907 franchises.

The only possible relief from the payment of this rental is through the right granted to the city, within lawful limits, to assess all or any part of the cost of subways upon private property specifically benefited thereby. This may be done only by special ordinance in each case, and the exercise of the right, with its probable attendant litigation, is doubtful. In the case of deficiencies in gross revenue, the only payments having priority over the city rentals are operating expenses and reserves, taxes and fixed charges on prior obligations.

It is apparent that the 6 per cent charged for rental is not cost. It is probably much more than cost, for the usual sinking fund should not be necessary as the lessee undertakes to "maintain, repair and renew" the entire subway system throughout its indeterminate lease. Combined interest and sinking fund charges on the Boston subways are less than 5 per cent, so that Chicago is apparently anticipating a profit from its subway leases.

5. Return on Capital Value

The simplest form in which return on the investment can appear as an element in cost of service is a fixed, straight percentage on capital value. None of the service-at-cost franchises has this simplicity. The nearest approach to it is found in Cleveland and Des Moines, where actual, existing fixed charges are allowed on funded indebtedness and 6 per cent on the remainder of capital value, represented by stock and floating debt. This means a variable average return as the proportions of indebtedness and stock change. In Cleveland, bonds bearing 5 per cent interest have gradually been retired and replaced by 6 per cent stock. The market value of this stock has remained appreciably above par since 1911, when the franchise was amended to increase its security.

Slight modifications of this general plan are found in the Boston, Bay State and Massachusetts acts. Actual fixed charges, either existing or future, are provided for in all these acts and, in addition, fixed rates of return upon stock investments. The Boston act authorizes a $3,000,000 issue of preferred stock paying 7 per cent dividends, and an ultimate return upon present or future common stock of 6 per cent. During the first five years the return on the common is less, being 5 per cent during the first half of that period and 5½ per cent during the remainder of the period. The Bay State and Massachusetts acts provide for 6 per cent uniformly upon capital stock investment.

The Chicago consolidated basis of return is somewhat similar. Fixed charges of 5 per cent are allowed upon prior obligations of the old companies (not to exceed 60 per cent of the total capital value) and 8 per cent is allowed on the balance of the capital value until 1932, with 7 per cent thereafter.

The Philadelphia franchise allows actual fixed charges upon prior obligations, and actual charges and dividend requirements upon all new capital issued under authority of the supervisor. Dividends upon the prior capital of $30,000,000 are to be paid at the rate of 5 per cent if and when the city is paid a similar return upon its investment in new transit facilities. These payments are cumulative.

All the above grants accept the rates of return fixed or to be fixed by investors for secured loans. The grants themselves fix the return upon unsecured investments. The difference in most cases is 1 per cent. Theoretically, there is the same assurance of return for both classes of investment under the service-at-cost plan during the life of the franchise. Under an indeterminate franchise (or a term franchise with obligations of renewal or purchase) with satisfactory terms of purchase, the theoretical difference in security of principal is small. There is, however, in the minds of investors a practical, material difference. It may be worthy of note that in one service-at-cost city, the Mayor not long ago in all seriousness proposed that the guaranteed return of 6 per cent to stockholders be reduced to 4 per cent during the continuance of war prices, so that an increase in fares, then materially less than 5 cents, might be avoided.

> SINCE the passing of the horse cars, the operation of the street railways has imposed no material added burdens upon pavements but they have continued to pay a large proportion of the cost. Hundreds of miles of streets have been paved solely because of the car tracks therein, and the street car revenues have been steadily decreased by the resulting encouragement to vehicular traffic.

There is grave doubt, in view of recent radical changes in investment conditions and the improbability of return to the former more stable conditions, if it is now possible to fix an equitable return upon long-term investments. If the return becomes too low, the investment field is restricted; if too high, the cost of service becomes excessive. This condition is recognized in the most recent franchise draft in this class, that in Cincinnati, in which the actual cost of all new money invested under the franchise is allowed. In this franchise the class of securities, the normal rate of return thereon, their amortization provisions, the price at which they are sold and other pertinent conditions are all subject to the approval of both the local supervisor and the State Utilities Commission. The prevailing return upon prior securities is maintained. In this way, investors, public, company and any other parties concerned are protected.

The sliding scale principle, well known among English utilities but used to only a very limited extent in this country, is embodied in one of the railway franchises included herein. The Dallas grant has a sliding scale of return on the capital value in connection with the fare schedule already stated. When the highest authorized rate of fare is in effect, the return is fixed at 7 per cent. When the next lower rate is adopted, the return becomes 8 per cent. For each of the lower rates included in the schedule an additional one-half of 1 per cent is allowed. This gives a maximum possible return of 9 per cent, but the probability of this rate being earned is quite remote unless there is a very radical change from present conditions.

TABLE II—CHICAGO SURFACE RAILWAYS

Statement of City's Share (55 Per Cent) of Surplus from Operation Under 1907 Franchises

1908	$1,564,618.47
1909	1,386,877.96
1910	1,276,252.65
1911	1,705,550.30
1912	1,870,908.00
1913	2,529,992.26
1914	3,002,453.16
1915	2,558,383.63
1916	1,665,710.34
1917	2,746,988.99
	$20,307,735.76

The sliding scale principle has the advantage under stable conditions that it encourages efficiency of operation. However, with such a radical increase in operating costs as has taken place since the Dallas franchise became effective, a higher fare, logically necessary, involves a lower return to the investor and at a time when money is commanding materially higher rates, the investor therefore being subject to a double injustice. The reverse condition of a higher return with a lower fare resulting from business stagnation is equally open to criticism. The results of this application in Dallas of the sliding scale to a railway situation will be watched with interest, but satisfactory working is not to be expected under present unstable conditions. It will probably also be found that the fare and return steps contained in this franchise are too large for stability. Alternate up and down changes at the prescribed minimum intervals of six months are to be expected if the fares ever get below the maximum rate.

The remaining franchises in this group embody the profit-sharing principle of return. Supplementing a minimum fixed return on the capital value, there is a division of surplus earnings between railway and city. This method was first adopted in the Chicago surface franchises, which allow a return of 5 per cent upon the capital value plus 45 per cent of the surplus. Fifty-five per cent of the surplus goes to the city to be used ultimately for the construction of rapid transit facilities. As shown in Table II, the city's share of the surplus during the ten full years of operation of these franchises ending in 1917 amounted to slightly more than $20,000,000.

The Kansas City arrangement is somewhat similar, but the railway gets a 6 per cent return upon the capital value without any distributable share in the surplus until it has amounted to $6,300,000. Further surplus is divided between railway and city, the railway getting only one-third. The initial $6,300,000 surplus is to be used in amortizing intangible elements in the capital value already referred to through the addition of uncapitalized extensions and betterments up to that aggregate amount. The city may use its share of the subsequent surplus to finance additions to the property with a view to ultimate purchase, to reduce the capital value, to reduce fares, or, by popular vote, for other public purposes. If fares are reduced, the railway's share of the surplus which would otherwise be accumulated must not be impaired, that is, the reduction must be made exclusively from the city's share of the surplus. The city's share in the surplus has so far amounted to only about $100,000.

The Cincinnati grant contains a combination of profit-sharing and sliding-scale principles. It provides for actual fixed charges on prior obligations, a fixed sum return on certain prior capital, and actual fixed charges and dividends upon all new securities issued in accordance with the new franchise. The company also shares in varying proportions in any surplus that may be accumulated. When the rate of fare is 5 cents or less the company's share is 45 per cent; when the fare is 5½ cents, the share is reduced to 30 per cent; when the fare is 6 cents, the share becomes 20 per cent; if the fare goes above 6 cents, the company gets no part of the surplus.

The Montreal grant allows a 6 per cent normal return upon capital value. Upon new capital furnished by investors during the war or within two years after its termination, an additional 1 per cent is allowed, but this supplementary return is wholly withdrawn within five years after the war. The railway also receives a further return to the extent of 20 per cent of the divisible surplus, the balance of the surplus going to the city (30 per cent) and the tolls reduction fund (50 per cent). There is no restriction upon the use of the city or company allotments. The purposes of the tolls reduction fund have already been explained. The company is not permitted to pay dividends on its stock in excess of 10 per cent.

This grant also provides for two supplementary allowances, one of which is unique in franchise history. The first is a fixed annual sum, equivalent to one-half of 1 per cent of the initial capital value ($181,431.47) for the expenses of new financing, including printing and engraving, legal and registration fees, listing, etc. Any unused part of this allowance must be kept intact with interest accretions until the termination of the franchise, when it may be distributed. This item of cost, where specifically provided for, is more commonly a

TABLE III—THE CLEVELAND RAILWAY COMPANY

Operating Expenses Less Maintenance and Total Cost of Service Under Tayler Ordinance, Actual and Allowances, Per Car-Mile

	Operating Expense		Total Cost	
	Actual	Allowance	Actual	Allowance
1910	11 67	11 50	24 28	23 09
1911	12 07	12 50[1]	25 88	23 59
1912	12 19	11 50	23 09	22 57
1913	12 23	12 10[2]	24 72	24 10
1914	12 22	12 10	25 27	24 32
1915	12 36	12 60[1]	25 70	25 49
1916	14 00	13 50[1]	28 16	28 33
1917	15 34	14 50	29 75	29 52
1918		16 00[3] 19 50[4]		

[1] On and after May 1.
[2] On and after March 1
[3] On and after Feb. 8
[4] On and after Aug. 4

charge to capital value. In the Chicago surface franchises a fixed percentage is allowed on the cost of all capital additions for this and other overhead costs. In Philadelphia the actual financing costs are included in capital value.

The unique allowance in the Montreal grant is an "operating allowance," an amount equal to one-eighth of 1 per cent of the current capital value, awarded to the railway annually if the actual operating expenses are within the amount per car-mile fixed by the supervisor as already explained, or do not exceed this amount by more than 2½ per cent, or, if exceeding it by a greater percentage, such greater excess is on account of abnormal conditions not within the control of the railway and certified as such by the supervisor. If the excess is not so certified, the railway receives no operating profit, and any expenses in excess of the allowance plus the margin of 2½ per cent thereof, less the one-eighth of 1 per cent of capital value otherwise allowed as an operating profit, must be made up from the railway's own resources.

The purpose of this operating allowance is distinctly commendable. It sets up each year a specific standard of operating efficiency in the light of conditions then existing, not those which a score of years before were thought might exist. If the standard is met by sustained vigilance, a deserved reward is made. If this vigilance is relaxed and extravagance is permitted, not only is the reward lost but the railway must pay the bill from its own pocket. The possible objections to such an allowance are obvious. The standard operating expense must be fixed with unvarying, scrupulous fairness and honesty, and in the light of sustained, intimate knowledge of operating conditions and requirements. Otherwise, either injustice is done the public, or the railway becomes discouraged in its efforts to maintain maximum efficiency. A tendency might develop to recognize past earnest but unsuccessful attempts of the railway to secure its reward by liberality in fixing a future standard of expense, or on the other hand past indifference on the part of the railway might suggest a relatively low standard. It would be difficult to decide if or when such tendencies were beyond the intent of the franchise in establishing this policy of reward. The whole scheme has needed and attractive possibilities, and its actual workings will be watched with interest.

6. Amortization

A large proportion of the mortgages upon electric railway property contain sinking fund or improvement fund provisions under which the outstanding indebtedness thereunder is gradually reduced, or the amount of property subject to a given indebtedness is gradually increased. The annual requirements for such funds, usually from 1 per cent to 2 per cent of the bonds outstanding or certified, are taken from gross income and are a part of the cost of the service rendered. The railways operating under the franchises herein considered are not exempt from this general practice. Several of them have supplementary amortization provisions which show special conceptions of the meaning or distribution of the cost of service.

The earliest of these franchises is that in Kansas City. The initial capital value in this case, as already noted, contained an item of $6,300,000 for intangible elements such as development cost and franchise value. It was decided that these elements should not be a permanent factor in the cost of service. To the extent that they represented the value of the surrendered old franchises, they should be wiped out by 1925, when they would have expired. To the extent that they represented unrecovered early losses, the necessity for amortization is not as clear. There is no unanimity of opinion as to how, if ever, early losses should be made up by regulated public utilities. In competitive business the problem is comparatively simple. The regulated utility may take care of its inevitable early losses in one of three ways: (1) By maintaining abnormally high rates during a definite succeeding more profitable period; (2) by never recovering the losses themselves but indefinitely earning interest thereon; (3) by gradually but not regularly charging off the losses from the profits of supernormal periods, together with a return on the unamortized balance. The first method involves injustice to the patrons of the period involved. The second method is not unjust to any patrons and is economically sound, but meets with a surprising amount of opposition—instinctive, political and otherwise. The third method, confessedly a compromise, is practical if not scientifically correct. The Kansas City franchise adopts this method. The entire surplus income, to the extent of the initial $6,300,000 accumulation, is to be used by the railway for uncapitalized extensions and betterments, thereby gradually substituting tangible in place of intangible property, until the latter is eliminated. The rate of substitution depends upon the profitableness of the business.

TABLE IV—CHARACTERISTICS OF SURPLUS RESERVES, THE FARE "BAROMETERS" IN SERVICE-AT-COST FRANCHISES

	Normal Amount of Reserve		Range of Upper and Lower Limits	
City	Dollars	Per Cent of Capital Value	Dollars Between Limits	Per Cent of Either Limit from Normal
Cleveland	$500,000	......	$400,000	40
Dallas	575,000[1]	8	....	50
Montreal	....	......	1,200,000 to 2,700,000	....
Philadelphia	....	......	2,500,000	....
Cincinnati	400,000	......	400,000[3]	62.5 37.5
Boston	1,000,000	......	600,000	30
Bay State	500,000	......	500,000	50
Massachusetts	....	6 to 12[4]	....	30
Chicago (cons.)	2,000,000	......	1,000,000[2]	50[2]

[1] Approximate initial amount.
[2] Below normal only, upward range not specified.
[3] $250,000 above normal; $150,000 below normal; all other specified ranges are divided equally above and below normal.
[4] Per cent of annual revenue.

The city may, if it sees fit, carry this amortization program further by applying its share of the surplus beyond the initial $6,300,000 to further uncapitalized extensions and betterments, or to reductions of capital value, thus decreasing the unit cost of the service. This program was predicated upon a profitable 5-cent fare.

The Philadelphia grant embodies no new amortization features other than a sinking fund on the city's transit facilities, presumably sufficiently large to retire the entire investment within a reasonable term of years. It confirms, however, an unusual amortization feature in the 1907 franchise by which a fund is to be accumulated to retire the entire issue of stock then outstanding at the expiration of that franchise, the city then becoming the owner of the property. There is no provision in the new franchise by which this amortization can be suspended other than temporarily. Clearly such proceeding burdens the present generation of patrons with a part of the cost of serving the succeeding generation.

The Chicago consolidated franchise contains the remaining amortization feature of interest. Five years after the effective date of the ordinance, the company must begin to accumulate such a fund. For the first five years thereafter, accrual is at the rate of one-quarter of 1 per cent of the capital value; for the next five years it is at one-half of 1 per cent; for the next five years it is three-quarters of 1 per cent; and after the end of the initial twenty years the rate of 1 per cent applies. Under the operation of this final fixed 1 per cent there must be no diminution in the amount of annual accrual although the capital value may decrease. This fund may be used for retirement of outstanding obligations or to pay for uncapitalized extensions and betterments, the effect in either case being to reduce the capital per unit of property. If this franchise were to continue in operation for about fifty years with the amortization annuity in scheduled effect, the equivalent of the original capital value would have been wholly retired, a large proportion of the annual cost of subsequent additions to property, financed through the amortization fund, would be uncapitalized, and the cost of service would be appreciably reduced. The then existing situation may be expressed mathematically if certain average assumptions are made. At the end of n years, with an annual increase of r per cent, the capital value would be $(1 + r)^n$ times the initial capital value. If $n = 50$ and $r = 5$ per cent, the capital value at the end of fifty years would be 11.47 times the initial capital value. The portion of capital retired through amortization would be 1.00/11.47 or nearly 9 per cent. If it is further assumed that one-sixth of the subsequent additions to property are financed through the amortization fund and therefore uncapitalized, it appears that between 15 per cent and 20 per cent of the total subsequent capitalization is not subject to regular capital charges. If these charges would otherwise be 40 per cent of the annual revenue, the reduction in revenue thereby becomes 6 per cent to 8 per cent. This reduction is partly but not wholly offset by the objectionable amortization annuity itself. To the extent that it is not offset, the patrons of early years contribute to the cost of the service in later years.

7. *Surplus and Reserves*

The final item in the cost of service, after the initial accumulation of the required surplus and sundry reserves, is negligible in the average year, including only such increases in these accounts as may be required by increased volume of business. In any particular year there may be an addition to the reserves from operating revenues if a deficiency exists, or a withdrawal if current revenues are insufficient to meet current expenses and charges. The methods and limitations of such procedure are more specifically described in a following section.

SUMMARY AND DISCUSSION OF COST ELEMENTS

The different elements of service cost as set forth herein may here be reviewed and useful conclusions drawn from their treatment in the different franchises.

1. A fixed allowance for operating expenses, changeable only by action of a City Council, is not practicable. An annual budget, prepared in the light of expected conditions, is much better as a means of checking actual operations and as a possible basis of reward for operating efficiency.

2. A minimum allowance for maintenance and replacements such as is commonly found is quite important, preferably one accrual for the combination. It should be materially in excess of current requirements unless the property has reached a maturity and stability unusual among street railways. There should be a limit to the accumulation of unused accruals. Although gross revenue is not a scientific basis of accruals and total reserve, it has definite practical advantages, particularly if the percentages of gross revenue are automatically adjusted to the prosperity of the business.

3. Taxes should be limited to the usual assessments upon commercial property. There should be no franchise or gross earning taxes.

4. Rentals of transit facilities should be limited to actual cost to the lessor. If rapid transit facilities are leased from the city, a provision for abatement of rentals when and to the extent that the traffic cannot properly bear the burden is to be commended.

5. The return upon capital should not be wholly fixed because the future normal return cannot be foreseen. Actual interest and amortization should be allowed upon indebtedness. A substantial proportion of preferred stock, bearing a fixed return, may well be authorized. The final equity, represented by common stock, should have a return varying with general business conditions or with efficiency of operation, or both. Without this last incentive to sustained alertness, stagnation will result. None of the franchises here reviewed has an ideal provision for an equitable return to investors. A share in the surplus, added to a fixed return, is commendable but may fail to accomplish its purpose under abnormal business conditions. The same objection applies to the sliding scale of rates and return. Within limits, the operating profit plan is thoroughly good. It might be improved by making it proportional to operating efficiency instead of being fixed. By combinations or amplifications of such methods, there should be assured to the holders of the final equity such an increase in their minimum return as will secure a degree of efficiency and progressiveness approaching that found in unregulated private business. Such incentives would involve no increase in ultimate cost of service. It would, among other things, tend to reduce the base rate of return.

6. There should be no amortization of capital as far as it relates to tangible property. There is no equitable ground for amortization of intangible elements of value representing the usual initial losses, but this may be permissible to a limited extent in times of prosperity when fares are not above normal. No noticeable burdens should be imposed for this purpose.

7. No further comment is necessary regarding surplus except to urge that no excessive accumulations be made from revenue, particularly when large reserves are available for specific purposes. This is particularly true of new franchises which go into effect during the prevalence of war prices.

Comparison of Requirements for Reserve Funds

All service-at-cost franchises seek to avoid frequent or large changes in fare by the use of sundry reserve accounts. The number and interrelation of these accounts is bewildering, at first sight at least, in some cases. In other cases extreme simplicity is found. The purpose in all cases is the equalization above stated, but the effect in some cases is to increase present burdens for the relief of the future. If present reserves, created from revenue, are unnecessarily large and are invested at low rates of return, the patron, indirectly getting the benefit of such return, becomes an involuntary investor in the railway instead of having an opportunity of finding a more attractive investment elsewhere.

A reserve for depreciation or replacements is required in all these franchises. In some cases, as already stated, maintenance and renewals are not distinguished, both being provided for in the reserve. The Montreal franchise fixes the appropriations to and the normal accumulation in the reserve. The Chicago (surface and consolidated), Cleveland and Kansas City franchises fix the rate of accruals but not the normal accumulation in the reserve. The accumulated reserve in Dallas is limited to a percentage of property value, varying as already stated. The Philadelphia accruals are not fixed other than that the rate for the city's transit facilities shall not exceed one-half of 1 per cent per annum. The method of accrual and amount of the reserve in the case of the remaining franchises are not fixed in advance. Judgment as to adequacy rests with the supervisor except in the case of Cincinnati, where the utilities commission will fix the procedure after an initial period of five years.

A reserve for accidents is provided in most cases; it is specifically excluded only in the case of Cleveland where a board of arbitration decided that such a supplement to the so-called "interest fund" was not contemplated in the ordinance. In Dallas the accrual to the reserve is initially fixed at 6 per cent of the gross revenue, with provision for any necessary change. In other cases, rate of accrual and extent of the reserve are left to the judgment of the supervisor.

The Montreal franchise provides for two special funds not found in other grants. The railway must build up from its own resources a guarantee fund of $500,000 from which to pay excess, unauthorized expenses, any penalties imposed by the city, and otherwise to insure the performance of franchise obligations. The fund must be deposited in an approved, accessible place and income from it belongs to the railway. To the extent that the interest upon money borrowed for this fund exceeds the income derived from it, a burden is imposed directly upon the company and indirectly upon its patrons which does not seem warranted by the practical advantages derived therefrom. The city is not without other adequate means of enforcing fulfillment of obligations, and excess expenses might be deducted from the company's share of the divisible surplus or otherwise made up by the company as it might see fit.

This same franchise also sets up a contingent reserve fund of another $500,000, by accruals from gross revenue not exceeding 1 per cent thereof per annum as an equalizing fund, but not having the fare-adjusting functions usually attaching to this fund. This contingent fund may be drawn upon to make good deficiencies in revenue and is restored as soon as sufficient revenues are available. We now come to the fund common to and a salient feature of all the modern franchises of this type, the index or barometer which determines fare changes, variously named interest fund, reserve fund, surplus reserve, emergency fund, etc., and herein called the surplus reserve. In general, this fund has a designated normal value, a lower limit at which fares must be increased and an upper limit at which fares must be reduced. Where specific reserves for replacements, accidents, etc., are set up, it is usually provided that the upper limit of the surplus reserve shall not be reached until all these subsidiary reserves are normal, brought up if necessary by appropriations from the surplus reserve. Unless otherwise stated in the following outline of the special characteristics of the various surplus reserves, the funds therein are capitalized and not accumulated from revenue.

> THE terms of this Philadelphia lease embody a broad recognition of the principle that a city as a whole may need improved transit facilities which the patrons of the facilities should not pay for in full. The removal of surface railway traffic from the streets is of substantial benefit to many business interests which must still use the streets. Rapid transit definitely enhances suburban real estate values. It is not unfair that some of these interests affected should, temporarily at least, bear a portion of the rapid transit burden. In the case of suburban real estate, an increase in assessed valuation in proportion to the increase in market value, and the application of the resulting increase in taxes or its equivalent to the charges on rapid transit facilities, would materially lessen the increased cost of transit service.

The Cleveland normal reserve is $500,000 with upper and lower limits of $700,000 and $300,000 respectively. There is no direct relation between the surplus reserve and the replacement reserve accumulation. There is now an enormous deficit in the replacement reserve, or would be if all appropriate charges had been made to it rather than to special suspense accounts. If the surplus reserve were used, as it should be, to make up this deficit, the present balance would be reduced by more than $2,000,000, possibly to $3,000,000 less than normal.

The Dallas franchise sets up from revenues a surplus reserve which is normal at 8 per cent of the current capital value. If, when the subsidiary reserves are not less than normal, the surplus reserve accumulates to 50 per cent above normal, fares must be reduced to the next lower step in the schedule. If, after six months' operation under the reduced fare, the subsidiary reserves are normal and the surplus reserve is still 30 per cent or more above normal, another fare reduction must be made. Further decreases may be similarly made until the reserve does not exceed normal by more than 10 per cent. It is, however, stipulated that no fare reductions shall be made until the full return authorized by the franchise shall have been paid cumulatively from the effective date of the grant.

If, under any rate of fare, the surplus reserve falls to 50 per cent of normal, the fare must be raised to the next step. If the reserve does not rise to 80 per cent of normal within six months under the operation of this higher fare, another increase may be made, and further increases may similarly follow until the reserve is not more than 10 per cent below normal. Thereafter no further increases may be made until the reserve has again fallen to 50 per cent of normal.

When the surplus reserve is in excess of normal by more than 10 per cent, and either subsidiary reserve is below normal, the railway must transfer to such reserve such amounts as are necessary to bring them up to normal, or such lesser amounts as will still leave the surplus reserve 10 per cent above normal. The noteworthy thing about this general plan is the relation of the surplus reserve to capital value, by which the reserve automatically increases as the property and business grow. This has a definite advantage over a fixed reserve which gradually grows smaller in proportion to the volume of business.

In the Montreal grant the so-called "tolls reduction fund" created from revenue performs in part the immediate functions of the surplus reserve. The operation of this fund has already been explained, and it will be recalled that its upper limit is between $1,000,000 and $2,500,000 at the discretion of the supervisor. In case of deficiencies in revenue, involving a possible increase in fare, the contingent reserve fund is also a factor. If in any year the deficiencies are such as to reduce the contingent reserve to less than $300,000, the deficiency therein and any in other subsidiary reserves must be made up from the tolls reduction fund. If this fund is thereby exhausted, fares must at once be raised to provide at least the prevailing full cost of service. So long as any balance remains in the tolls reduction fund no fare increase is necessary, for the contingent fund still remains. If the $500,000 normal amount of the contingent fund were made the minimum limit for fare increase purposes of the tolls reduction fund, the complication of the combination of funds might have been avoided.

When the new Philadelphia franchise goes into effect, the surplus accumulated during the prior operation under the 1907 franchise will be set up on the books as an "initial surplus." Any surplus earned under the new grant will be separately accounted for as "new surplus." The combination of these two accounts becomes the surplus reserve. Whenever the new surplus has reached the sum of $2,000,000 and has been increasing in substantial amounts during the two years preceding, and all costs of service have been met cumulatively, the rate of fare shall be reduced after approval of the utilities commission. Whenever, through increased cost or diminished revenue, the new surplus has become exhausted and the initial surplus has been drawn upon to the extent of $500,000, a higher rate of fares shall be effective after approval of the utilities commission. This plan, without definitely fixing a normal surplus reserve, provides a zone of such reserve, with upper and lower limits $2,500,000 apart, within which fares shall be fixed but outside of which they shall change.

The Cincinnati franchise provides for a normal surplus reserve of $400,000, of which $250,000 is to be procured from the sale of securities, the balance of $150,000 to be the entire initial surplus to that extent earned under the new franchise, beyond which amount the surplus is divided as already explained. Whenever after the normal surplus reserve has been created (which implies the full cumulative payment of all elements of service cost) it shall be increased by $250,000 or 62½ per cent, the fares then in effect shall be decreased. If within two months after the reduction the reserve continues to increase, a second decrease may be made. Whenever after the normal surplus reserve has been created the amount in the reserve shall be reduced by $150,000 or 37½ per cent, the fares shall be raised, and if after two months' use of the higher fares the reduction in reserve continues, another increase may then be made, and this process is continued until the reserve is restored. At the beginning of the franchise term, before the normal surplus reserve has been created, the fares may be increased from the initial tentative 5-cent rate if the results of two months' operation show that the revenue is insufficient to cover the cost of the service, and further increases may similarly be made at intervals of two months until the required revenues are obtained.

The Chicago consolidated grant provides for a surplus reserve of $2,000,000. Fares must be increased if this reserve is drawn down to $1,000,000 to make deficits good. The fare increase shall be calculated to restore the reserve to normal by the end of the following fiscal year. After the deficits have been made up fares may be reduced if, in the judgment of the trustees, a new deficit would not thereby be created. Fares may be decreased at other times if the accumulation in the reserve and the surplus receipts are "sufficient to justify it."

The Boston act requires the creation of a surplus reserve of $1,000,000. If at the end of any calendar quarter ending June 30, 1919, or thereafter the reserve is 30 per cent above the initial normal amount, and the revenues for the preceding quarter have exceeded the cost of service, the fares shall be reduced within one month. If at the end of any quarter ending June 30, 1919, or thereafter the surplus reserve shall be below normal by more than 30 per cent, fares shall be increased within one month. If the surplus reserve shall be entirely exhausted on June 30, 1919, or semi-annual dates thereafter, or the balance is insufficient to meet existing deficiencies, the trustees may call upon the treasurer of the Commonwealth for funds to make up all accumulated deficits in accordance with the Massachusetts policy already outlined.

It is to be noted that, although June 30, 1919, is still in the future, two fare increases have already been made on the Boston Elevated system and others are under consideration to take care of large deficits, but no call has yet been made upon the State for aid. It is reported, however, that the trustees will shortly recommend that the State purchase from the company its part of the subway system, and relieve the company of all charges upon the entire publicly-owned rapid transit facilities used by the company.

The Bay State act fixes the amount of the normal surplus reserve at $500,000 and the upper and lower limits, beyond which fares shall be changed under procedure similar to that in the Boston act, at 50 per cent from the normal.

The Massachusetts act fixes the reserve less definitely, in per cent of the capital value, but establishes the upper and lower limits 30 per cent from normal, with procedure in fare increases similar to the other acts already mentioned.

A review of these various reserve programs shows unanimity in favor of accumulations for replacements, and nearly the same agreement in favor of an accident reserve. There is also a fare index fund where varying fares are contemplated. In connection with the upper and lower limits of such funds, fixed to indicate the need of a change in fare, attention is directed to the stipulation in a few cases that fares shall be changed when these limits are reached only if there has been a general upward or downward tendency in surplus revenues for a considerable period of time in the direction confirming the need of the fare change. The two-year tendency period fixed in Philadelphia may be too long, but the application of the principle will tend to prevent needless fluctuations in fares at times of brief especially good or bad business conditions. Other special funds or reserves, found in a few cases, apparently serve no essential purposes and might be eliminated for simplicity by slightly modifying the functions or characteristics of those universally employed.

> THE advantages of unlimited life, in avoiding amortization of investment in excess of adequate provisions for depreciation, and in not discouraging improvements and extensions at any period, are too obvious to need elaboration.

Several diagrams are shown on page 17, illustrating the relation between reserves, current operating revenues and service costs. These diagrams set forth more clearly than descriptive text the direction of flow of available funds from revenue to divisible surplus, the interrelation of revenue, costs and reserves, and existing priorities in disbursements.

PENALTIES

Little needs to be said with respect to the penalties which may be imposed under these franchises for violation of their terms, with the exception of two which have unique provisions. These penalties are in the form of a reduction in return upon capital value not exceeding 1 per cent for any and all offenses. In both the Cleveland and Dallas grants the application of such severe measures is limited to matters submitted to arbitration and to violation of decisions with respect thereto. The board of arbitration determines the amount of the penalty (within the limit fixed) in Cleveland, and its duration, coinciding with the violation of the decision, in both Cleveland and Dallas.

GENERAL PROVISIONS

Most of these franchises do not differ from older forms of grants with respect to the various general terms and conditions usually considered essential in such cases. There should be a noticeable difference in certain matters from the public point of view. Where the public is paying the costs of service, it should be careful that it does not set up extravagant standards or provisions, such as special types of track construction, iron poles exclusively, power plants, carhouses and other extensive buildings upon expensive city real estate, etc. Provisions that cars shall seat not less than forty passengers and be operated by two men are inconsistent with the latest developments for efficient service. On the other hand, an agreement that the city may call upon the railway to clean and water occupied streets at bare cost plus 10 per cent when traffic will not be impeded, is quite consistent with the fundamental intent of these grants.

A wise provision in this or any other form of franchise is that which permits the cancellation of any specific requirement or feature found to be unlawful without disturbing the rest of the grant, provided the matter in question is not an essential one or was not a controlling or material inducement to the making of the agreement. In the matter of extensions of lines and service, aside from certain initial or minimum requirements, a commendable policy is embodied in a number of these grants to the effect that extensions into new territory will not be required when their operation would impair the present of future ability of the railway to earn a reasonable (or specified) return upon its property as a whole. Other than for such restrictions, the cities may order any new facilities that appear to be needed. Ability to finance the necessary expenditures upon reasonable terms is a further limitation found in a few cases.

Arbitration of disputes in the conventional way is permitted in nearly all cases, but there is a noticeable tendency to restrict the scope of arbitration, leaving many matters to the decision of the supervisor, and others, on appeal to the state utilities commission. In Philadelphia, all matters in dispute are referred to the regular supervisory board, having a member representing each side and a neutral member. This plan has an advantage over the ordinary arbitration board in that at least two of the members are intimately acquainted with the matter at issue and are no more biased than the usual party members in arbitration.

MUNICIPAL PURCHASE

The right of the city to purchase the railway property under service-at-cost franchises is included in all such grants so far in effect, although it does not appear to be an essential element in those not of indeterminate form. This right is limited as to time in several cases—Dallas, after ten years; Philadelphia, after July 1, 1927; Montreal, on March 24, 1953, and at five-year intervals thereafter. In the other cases the right may be exercised at any time after reasonable notice, usually fixed at six months.

The price to be paid in nearly all cases is based upon the capital value with sundry allowances and adjustments described below. In Cincinnati, the city reserves the alternative right to proceed under the State law and pay a "just compensation." In Montreal, the purchase price is to be fixed by arbitration, it being stipulated that the capital value shall not be conclusive evidence in such proceeding. There appears to be no logical reason for this last departure from the usual practice. If the initial capital value was fairly determined and additions thereto and deductions therefrom are all properly handled, and if the return to the investors throughout the life of the grant is no more nor no less than fair, involving no return to them of principal (all of which is insured by the terms of the grant) the appraised value should not differ from the then capital value except possibly for an item appearing in another franchise, the value of future rights of participation in divisible profits. With the exceptionally long initial immunity from city purchase fixed in the Montreal franchise, this value should be negligible.

In all cases the property purchased includes funds created for replacements, damages, etc. Adjustments are of course required where these funds have been invested in the property. Where indebtedness is assumed by the purchaser, it must also be deducted from capital value. The disposition of cash and current assets and liabilities is in accordance with usual commercial practice.

A percentage premium is stipulated in several of the purchase provisions. In Cleveland the city must pay 10 per cent in excess of the capital value less any indebtedness assumed. This premium is not paid if purchase occurs after the expiration of the original term. Dallas must pay 5 per cent in excess of the capital value plus an additional 5 per cent upon that part of it representing additions to the property during the preceding ten years. Kansas City may take over its railway without premium payment when its share of surplus income invested in the property amounts to 50 per cent of the capital value. If the property is taken before this 50 per cent has accumulated it must also pay the company "the value of the remainder of its rights to participation" and the cost of redeeming outstanding bonds.

The percentage premiums above stated may be considered as compensation for terminated profits, for retirement of obligations and other liquidation costs, for amortization of financing costs and other intangible assets not included in capital value, etc. Where such purchase allowance does not appear, a compensating substitute is sometimes found in the form of a cumulative payment of any deficits in return from the date the franchise becomes effective to the date of sale. Where the return is an undivided fixed one this does not apply, but the following applications in other cases are noteworthy.

The Philadelphia franchise requires the city to pay, on purchase, any deficiencies in past dividends on either new or old stock. The Cincinnati franchise requires the city to pay all past deficiencies in operating cost and return to investors, together with interest on any money borrowed to finance deficiencies. The Chicago consolidated franchise apparently has the equivalent of this guarantee against final deficiencies, as it clearly states that the various items of service cost, including interest and dividends, shall be cumulative. The Dallas franchise states that any balance remaining in the surplus reserve at the time of purchase by the city may be applied to the payment of the full return authorized for the rates of fare from time to time in effect. Apparently during the first year of operation under this franchise no surplus was accumulated, for the total earned return was materially less than the 5 per cent minimum allowed before the surplus receives any credits.

An alternative purchase provision is contained in the Chicago surface, Cleveland and Dallas franchises under which the city may designate another purchaser than itself. The purpose of this provision is to secure better terms under private operation than the original grant contains. In Cleveland this is accomplished through reduction in the rate of return, the purchaser being required to accept a rate at least one-quarter of 1 per cent lower than the rate in effect. No provision of this kind is embodied in the other grants, so that the advantage of the so-called licensee clause is not apparent except as a club over the holder of the franchise. The purchaser or licensee in Dallas must pay a 5 per cent higher premium than the city on that part of the capital value applicable to property more than ten years old.

The practices above outlined indicate that the right of purchase should be retained by the city, preferably for its own exercise alone, and that the purchase price should be the adjusted capital value, with a percentage bonus if the property may be taken at any time. There are advantages in an initial period of undisturbed private operation, followed by the right to purchase at stated intervals with a gradually decreasing bonus.

The purchase should include the entire property whether or not within the city limits, unless the outside property is of such size and independent patronage that it may be satisfactorily operated as a separate unit. If partial purchase is permitted, a stipulation for severance damages should be made. The provision in some of the franchises, that any deficiencies in return below the authorized standard rate, which may be possible during operations thereunder, shall be fully made up and paid as an addition to the purchase price, should be of universal application.

CONCLUSIONS

Of the twelve ordinances or legislative acts herein considered, providing for service-at-cost, one has been in use for nearly twelve years. Eight have been in effect or submitted for approval within a period of little more than a year. All of the eight provide for automatically variable fares, while three of the four older ones do not. All of the recent eight also provide for some flexibility in return to investors, whereas in two of the older ones such flexibility is largely lacking. In only one of the recent franchises is a newly established capital value noticeably diminished for depreciation, but two of the earlier four values were largely depreciated. Public management, through trustees, is established in three of the recent drafts but in none of the older ones. A return of about 6 per cent is the maximum contemplated in most of the older grants. Seven per cent is authorized on certain issues among the new ones, with 9 per cent as a maximum limit in one case, the average being appreciably higher than in the former cases.

The above fragmentary summary shows definite, progressive tendencies in service-at-cost features, partly based on experience, but largely due to development in economic thought applicable to such problems. The tendencies now in evidence will undoubtedly continue and future franchises of this class will show increasing departure from earlier methods, particularly in the direction of increasing flexibility in the various necessary standards by which service and financial matters are measured.

WHAT CONSTITUTES A LOGICAL FRANCHISE?

It may be appropriate, in closing, to supplement the various scattered comments and criticisms contained herein by a very brief statement of the writer's conception of the logical outcome of the present tendencies in service-at-cost franchises. To that end, the characteristics which the essential features herein discussed may well embody in new drafts in the not distant future are here given in very brief outline.

The accompanying outline is not intended as the foundation for a model franchise. It is merely a statement of facts and tendencies with respect to a few of the many features which modern franchises contain. Those not considered herein have, to a large extent, become standardized. Many of them might safely be omitted in these days of state and municipal supervision. The features herein considered are still far from standardization. The most striking general tendency in that direction is in matter of flexibility. The earliest service-at-cost franchises were far too rigid and unadaptable. The later forms have not yet tested their improvements in this respect, but it is, nevertheless, confidently expected that their success will encourage further advances in the same direction.

Nothing has so far been said about freedom from competition under service-at-cost operation, because it is not a prominent, expressed feature of the franchises discussed. One of them specifically states that it is not an exclusive grant, and the laws of many states prohibit monopolies. On the other hand, an increasing number of states are providing specifically for exclusive public service under indeterminate rights. Service at cost means, fundamentally, adequate, comprehensive transportation with the lowest possible charges consistent with permanence of service, security of investment and regularity of return to investors. Freedom from competition is economically essential to both minimum cost and maximum security under public regulation, and should be provided for in some effective manner in all service-at-cost franchises.

Essential Features of a Modern Franchise

As Outlined by MR. NASH

TERM: Indeterminate.

CAPITAL VALUE: Cash investment, if accurately or approximately determinable, or cost of reproduction without deduction for depreciation.

SUPERVISION: A single supervisor, independent and technically trained, for all except quite large properties; for the latter, a board of three, representing city, company and state, the last named preferably appointed by the utilities commission. Appeal from supervisor or board to state commission on the more important matters. Extend scope of supervision if necessary to avoid public operation.

FRANCHISE TAXES: None should be imposed. Paving and other similar burdens which are equivalent to such taxes should be abolished.

PUBLIC CONTRIBUTIONS: Railways should be permitted to receive community assistance from taxation authorized by state when necessary to maintain essential service. Relief should not be wholly limited to present war period.

FARE SCHEDULES: Franchises should not embody any fixed fare schedules or limits. These should be left to the supervisor, with confirmation by the utilities commission. Schedule steps should be published in advance, and fare changes should be automatic, small and as infrequent as possible through adequate reserve funds.

COST OF SERVICE: The cost elements should include (1) actual operating expenses, if reasonable; (2) an accrual for maintenance and replacements, usually in excess of current requirements, unexpended portions to be accumulated; (3) actual taxes on the usual commercial basis; (4) return on investment made up of actual interest and sinking fund requirements, a minimum assured return upon remaining capital, a part or all of which should also participate in surplus earnings and possibly in special rewards for efficiency.

RESERVES: Should include an adequate but not excessive reserve for depreciation, an accident reserve and a fund or reserve for contingencies and automatic fare regulation. One regulating fund should be sufficient if its limits are carefully defined and applied with suitable reference to current revenue tendencies.

MUNICIPAL PURCHASE: The right of the city, but no other party, to purchase at any time all, but not less than all, the railway property at its then capital value plus a percentage premium if purchase is made early in the franchise life.

The Fuel Administration and the Skip Stop

How the Federal Government and the Electric Railways Co-operated in Several Ways to Save Fuel, with Special Reference to Eliminating Unnecessary Stops

By J. F. LAYNG
Railway and Traction Engineering Department General Electric Company
Formerly Bureau of Conservation United States Fuel Administration, Washington, D. C.

J. F. LAYNG

Mr. Layng has divided his active career between the manufacturing and railway operating fields. For a time he was with the Westinghouse Company, beginning with the apprentice course, and served in several engineering departments. For six years he has been engaged in general consulting work for the General Electric Company, the last three years having been devoted to a study of electric railway operating economics. A most important article on this subject written by him appeared in the 1918 statistical issue of this paper. During the last few months Mr. Layng has been doing special work for the Fuel Administration.

WHEN the United States Fuel Administration was created the electric railways wished to do all in their power to save fuel and to work in harmony with the new governmental organization. To facilitate this movement the American Electric Railway Association appointed a joint traffic and engineering committee, with J. P. Barnes, general manager Schenectady Railway, as chairman, and L. H. Palmer, assistant to the president United Railways & Electric Company of Baltimore; G. H. Kelsay, superintendent of power Union Traction Company of Indiana; M. B. Lambert, assistant manager railway department Westinghouse Electric & Manufacturing Company, and the writer as members.

The joint committee compiled information for use on posters which were sent out by the Fuel Administration to the railway companies. These posters were as listed below:

Poster No. 1, entitled "Uncle Sam Needs that Extra Shovelful," showing Uncle Sam (silhouetted) at the fireman's elbow. This poster was designed to impel the fireman to save coal. Poster No. 2. An "Uncle Sam" poster, which showed his face with a severe expression. It was addressed to the carhouse men, and listed the several elements which would influence power consumption from a car maintenance standpoint.

Poster No. 3. The "Eagle" poster, the appeal of which was directed to the conductors and motormen. It illustrated the ways in which they could help in the saving of power.

Poster No. 4. A car card designed to be placed in the car advertising racks, containing the statement that the motormen and conductors of the car were members of the United States Fuel Administration.

POSSIBILITIES OF THE SKIP STOP WERE EARLY FORESEEN

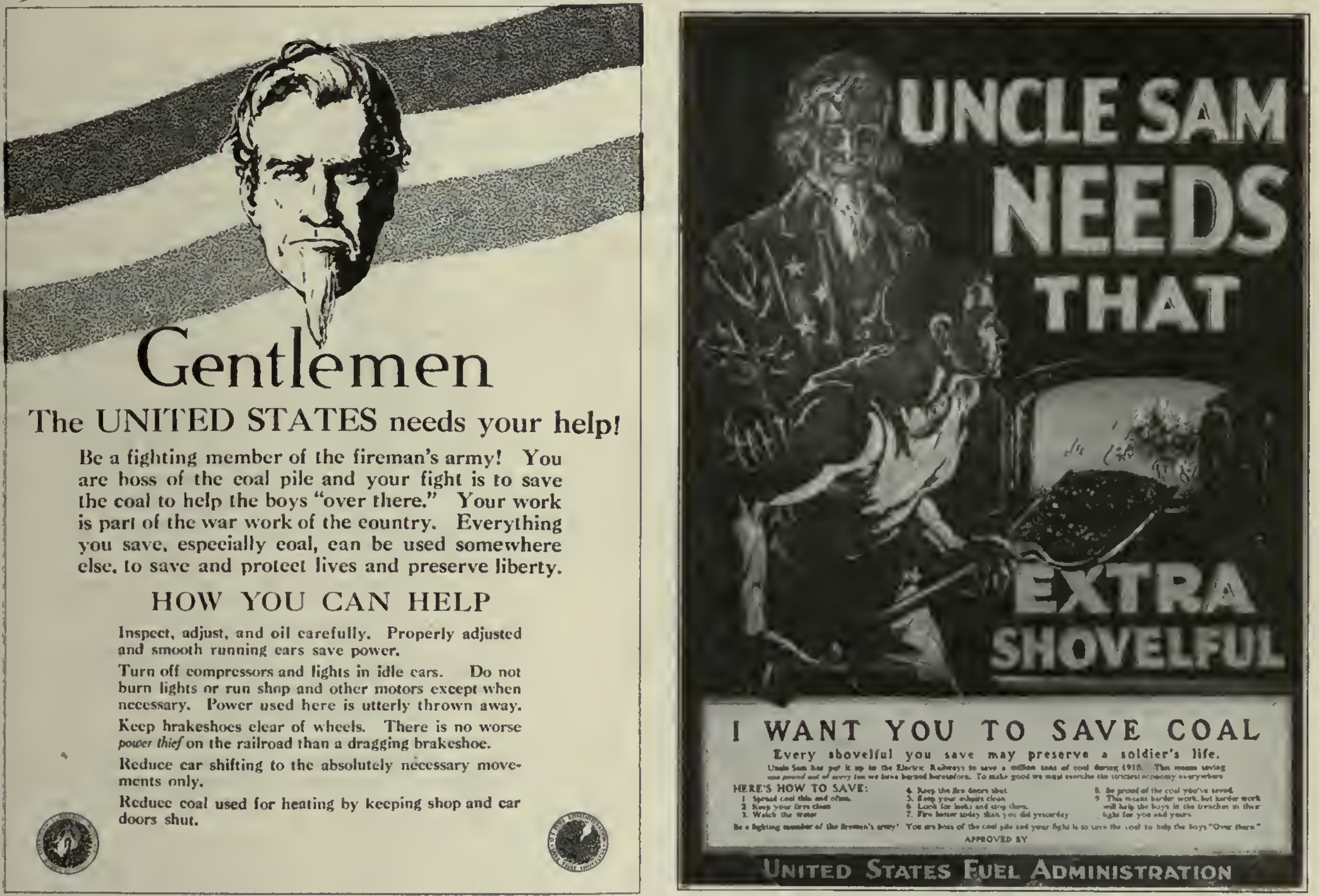
During March, 1918, it was realized that by using the skip-stop system of operation in the large cities of the country great fuel economies could be realized. In order to start the skip-stop campaign properly the Fuel Administration, on recommendation of the War Board of the American Electric Railway Association, recommended it for use in the national capital. John A. Beeler, consulting engineer, carried out the War Board's suggestion, and he proceeded at once to adapt the skip-stop principle to local conditions in Washington. The result has been covered in several articles in the ELECTRIC RAILWAY JOURNAL.

For the purpose of following up the work that was done for the Fuel Administration in Washington an engineer on the Administration's staff was assigned to the duty of requesting the general adoption of the skip-stop system in car operation in the cities of the country, and a part of his duty was to see that proper information for this purpose was supplied.

The promulgation of the system was continued, city by city, up to the latter part of August, by which time practically one-third of the cities in the United States had adopted the skip-stop method of operation. Entire states, such as Massachusetts, Connecticut, New Jersey, Pennsylvania, Texas and Tennessee, adopted the system in all principal cities. The favor with which the plan was received prompted the Fuel Administration to issue a general request that all cities in the United States having populations of 25,000 or more should adopt the skip-stop system. This was done in the belief that annual fuel savings in excess of 1,500,000 tons would thus be secured. This request met with a most gratifying response. Mayors of cities and many others wrote commending the Fuel Administration for taking the initiative in the matter. This result was the more significant when we consider that in the elimination of stops the electric railways are changing the habits of a generation. The result of the campaign has been that car schedules have been "speeded up" and, speaking generally, 10 per cent or more of the time which passengers would otherwise have had to spend on the cars has been saved.

One of the problems confronting the Fuel Administration was properly to present to those who had the guidance of electric railway properties the urgency of the need for installing the skip-stop system. For this purpose a number of bulletins were prepared and copies were sent to all state fuel administrators working under the federal Fuel Administration, to public service commissioners, to mayors, to city councilmen, and to electric railway officials. To secure the co-operation of the American Electric Railway Association War Board, the Fuel Administration appealed to this body, by letter, and asked it to use its influence to insure the proper carrying out of the administration's request. The War Board reproduced this letter in its bulletin No. 29, dated Aug. 29, 1918, which was sent to all electric railways. The substance of the important bulletins issued by the Fuel Administration is reproduced on the following pages.

Entirely aside from the question of power saving, the Fuel Administration used its influence to see that the skip-stop system was installed in the different cities of the country because this principle of operation was known to be economically sound. Saving of time in transportation means a very great deal in connection with community growth. Providing that we have means of rapid transit it is possible for us to live at greater distances from our places of occupation than would otherwise be possible. We can thus raise our children in suburban homes rather than in city flats. Rapid transit economizes the time of the daily car rider and renders available for him a certain extra amount of time which he can spend either at his place of business or at his home. The amount of time which can be saved to the entire body of citizens of the country in this way in the aggregate amounts to a considerable total. The inconvenience to passengers which is occasioned by the relocation of stops is much more than balanced by the saving in time.


Gentlemen
UNCLE SAM NEEDS THAT EXTRA SHOVELFUL

The UNITED STATES needs your help!

Be a fighting member of the fireman's army! You are boss of the coal pile and your fight is to save the coal to help the boys "over there." Your work is part of the war work of the country. Everything you save, especially coal, can be used somewhere else, to save and protect lives and preserve liberty.

HOW YOU CAN HELP

Inspect, adjust, and oil carefully. Properly adjusted and smooth running cars save power.

Turn off compressors and lights in idle cars. Do not burn lights or run shop and other motors except when necessary. Power used here is utterly thrown away.

Keep brakeshoes clear of wheels. There is no worse *power thief* on the railroad than a dragging brakeshoe.

Reduce car shifting to the absolutely necessary movements only.

Reduce coal used for heating by keeping shop and car doors shut.

I WANT YOU TO SAVE COAL

Every shovelful you save may preserve a soldier's life.

HERE'S HOW TO SAVE:

APPROVED BY

UNITED STATES FUEL ADMINISTRATION

TWO EFFECTIVE "UNCLE SAM" POSTERS DESIGNED TO INDUCE CAREFUL FIRING

Another fact is that when cars can deliver passengers to their destination in less time the population of a city is more evenly distributed. This factor, together with that of the reduction in running time of 10 per cent or more, greatly enhances real estate values in a community. These items are mentioned to illustrate the advantages which can be obtained in electric railway operation through the skip-stop system without additional investment.

AN ILLUSTRATION FROM CHICAGO

Many people prefer the skip-stop system even when there is not a time saving to be made. This is illustrated by service which is given on the South Side lines of the Chicago Elevated Railroads. Over a portion of these lines three tracks are employed, one of which is used during the rush hours exclusively for one-way express traffic. On the other two tracks both local and express trains are operated. The "locals" on these two tracks naturally limit the running time of the express trains, but many passengers transfer from the locals to the express trains to secure a ride free from the continual starting and stopping of the trains.

The total time saved in any community by using the skip-stop system is enormous. For example, let us assume that with the old arrangement eleven stops were made per mile, the stops thus being 480 ft. apart. The greatest increase in any walk possible, as affected by stop locations, is then 240 ft. On this basis the average passenger would walk 120 ft. each at the beginning and end of his ride, a total of 240 ft. Walking at a rate of 5 ft. per second he would require forty-eight seconds to cover this distance.

If we assume that the stops on a whole system, including business, residential and suburban districts, would average seven per mile, or 754 ft. apart, and making our calculations on the same basis, the average walking time, thus revised, would be 75.4 seconds. The net loss in time due to the relocation of stops would be 27.4 seconds. On a transportation system carrying 300,000,000 passengers annually the total extra walking time per year would be about 2,210,000 hours.

Assuming further that the average length of the lines on this system is 9 miles and that the schedule speed of operation is 9 m.h.p., and assuming further that the use of the skip-stop system will reduce the running time by 10 per cent, there will be a time saving per trip of six minutes. Then half of this time, three minutes, would be saved to the average passenger. A total of 300,000,000 passengers would thus enjoy an annual saving of 15,000,000 hours.

Deducting the lost time due to the extra walking, there remains the enormous time saving of 12,790,000 hours which, even at the nominal value of 20 cents per hour, is worth $2,558,000 per year. Time conservation is an important element in the continuance of our country's prosperity, and saving of car riders' time is a part of this conservation.

SKIP-STOP SYSTEM WAS WIDELY ADOPTED

It is interesting to note that approximately 95 per cent of all the cities in the United States which were appealed to in the skip-stop campaign adopted the system. Of these a few will possibly abandon it temporarily, but as the plan is economically sound and greatly promotes community growth the cities which do abandon it will be handicapped in competition with their rivals.

The writer takes this opportunity to acknowledge the enthusiasm and cordiality with which assistance was given to the Fuel Administration by all those appealed to. Railway, administrative bodies, and the public generally pulled together in a "win the war" spirit to assist in saving fuel.

Exhibit I

LETTER TO STATE FUEL ADMINISTRATORS

Skip-stop service, effecting large savings of fuel, has been adopted in many communities. The actual saving in power when skip-stop service is adopted in a city varies from 8 to 16 per cent. Therefore, as a conservation measure during the war, the skip-stop system is of urgent importance.

Moreover, the skip-stop service on our street railway systems means a large saving of the time of the car riders. The same service can be given with less cars or, in other words, more service can be given with the same cars. In these times when all the available man-power is needed for war purposes, anything which we can do to conserve fuel and man-power is a patriotic service.

To put the system into effect, we shall mail, from Washington, bulletin number 2882, addressed to public service commissioners, mayors, city councilmen, city commissioners and street railway officials. The bulletin states the objects which the conservation division of the United States Fuel Administration desires to accomplish and requests that the system be put into operation in every city of 25,000 and over.

From Washington we shall send to the railway companies instructions showing how the skip-stop service should be inaugurated. These directions have been followed in many cities and have been effective. Additional sets of the instructions will be sent on request.

Posters are being printed which can be placed in every railway car used for city and suburban operation. This poster reads:

> *Support the Skip Stop*
>
> It will save 1,500,000 tons of coal per year.
> More coal means more steel.
> More steel means more guns and ammunition.
> More guns and ammunition, a shorter war and fewer casualties.
>
> UNITED STATES FUEL ADMINISTRATION.

The posters will be sent directly from Washington to the street railway companies, who will be notified by letter that the posters are being forwarded.

It is extremely desirable to have the skip-stop service in operation before bad weather begins. If this system is started when weather conditions are good the public will learn the advantages of the system before thinking of the disadvantages which will naturally come with adverse weather conditions.

Many cities have already put the skip-stop system into operation. We are sending copies of our request even to these cities, in order that they may understand the general scope and progress of the work.

Because the situation is urgent, we suggest that you make a personal appeal as Fuel Administrator of the State for the skip-stop system to be started on Sept. 15, 1918. This date has been selected as the proper time to have the system started in all cities of our country.

In some cases, power to operate railways is secured from hydroelectric plants, and it might seem that these should, therefore, not be taken into consideration. However, in practically every instance, it will be found that steam plants are supplementing the hydroelectric supply, and any saving of power that can be made will come from the steam plant supply. In this way, all the power saved by skip stops will mean fuel savings.

The work of Fuel Administrators, committees and their various associates has shown gratifying results in securing the adoption of skip-stop service. It is desirable that all those who have contributed to the success of the movement, follow up the actual operation and continue to give the railway companies the benefit of their counsel. In this way, maximum fuel saving will be obtained and most efficient service rendered.

Yours very truly,
UNITED STATES FUEL ADMINISTRATION.

Exhibit II

LETTER TO PUBLIC SERVICE COMMISSIONERS, MAYORS, CITY COUNCILMEN, CITY COMMISSIONERS AND STREET RAILWAY OFFICIALS

As a fuel conservation measure during the war, all cities having a population of 25,000 and over are requested to have their street railways operate the skip-stop system and also to regulate car heating and car lighting so as to secure the minimum power consumption.

The power required for starting a car is six or eight times as great as that required to keep it in motion. A considerable part of the power for operating street cars is due to the frequent stops which the cars make. A partial list of the states and cities where the skip-stop system has been adopted is indicated below:

California:
  Berkeley
  Alameda
  Los Angeles
  San Diego
Connecticut:
  All cities
District of Columbia
Delaware:
  Wilmington
Illinois:
  Chicago
Indiana:
  Indianapolis
  Evansville
  Fort Wayne
  South Bend
Iowa:
  Des Moines
Kentucky:
  Louisville
Louisiana:
  New Orleans
Massachusetts:
  All cities
Maryland:
  Baltimore
Michigan:
  Detroit
  Grand Rapids
Minnesota:
  Minneapolis
  St. Paul
Missouri:
  Kansas City
New Jersey:
  All cities
New York:
  Brooklyn
  Rochester
  Syracuse
  Schenectady
  Albany
Ohio:
  Cincinnati
  Columbus
  Dayton
  Toledo
Pennsylvania
  All cities
Rhode Island:
  Providence
  Woonsocket
  Newport
South Carolina:
  Charleston
Texas:
  All cities
Tennessee:
  All cities
Virginia:
  Norfolk
  Richmond
  Portsmouth

Annual savings at the points which we have mentioned total more than 500,000 tons of fuel, all of which can be devoted to war purposes. When all cities in the United States have adopted the skip-stop system, the total annual

THE Motorman *and* Conductor of this car are members of the

U.S. FUEL ADMINISTRATION

and *they* are pledged to save Electricity, which means COAL

WAR BOARD AMERICAN ELECTRIC RAILWAY ASSOCIATION

CAR CARD IDENTIFYING CREW WITH COAL CONSERVATION MOVEMENT

savings will be at least 1,500,000 tons. The skip-stop system not only brings about this saving in fuel at a time when our nation is facing a dangerous fuel shortage, but it also brings about an actual improvement of the service of the street railway companies. The elimination of stops enables the street cars to move their passengers to their destination more rapidly and with more comfort. For instance, in Minneapolis the length of a forty-minute car trip has been reduced to twenty-five minutes. In Washington, a trip that was formerly forty-seven and one-half minutes has been reduced to forty-two minutes.

The skip-stop system does not contemplate putting stops so far apart as to be unduly burdensome. The Fuel Administration has requested that there should not be more than eight stops per mile (average 660 ft. apart) in business districts; six stops per mile (average 880 ft. apart) in residence districts; and four stops per mile (averaging 1320 ft. apart) in open country.

Before starting the skip-stop system it is suggested that a board consisting of five members be selected; two representing the city, two the railway and the fifth a representative of the Fuel Administration. The city members should obtain the views of the police and fire departments regarding dangerous points of traffic, providing they exist. The duty of this board is to select the car stops and see that instructions regarding the stop marking advertising and general policy are carried out that the public may be given the best service with maximum fuel economy.

After the skip-stop system has been started, requests are often made to have stops restored. Great care should be selected in the elimination of stops by the committee and it should be remembered that if stops cut out are restored, we do not have the skip-stop service. The committee selecting stops are requested, therefore, to make their surveys carefully before an announcement of the stops is made.

The United States Fuel Administration desires the adoption of this system by voluntary co-operation of public service commissions, municipal authorities, city commissions and street railways. Since the actual fuel saving is so great in the aggregate, every citizen who is a car user will desire to have a part in this saving and to use his influence to effect the maximum saving.

All mayors and those in authority are urged to have ordinances passed to keep vehicles off car tracks and keep the tracks clear of obstructions. In this way traffic will be accelerated and much time saved for the community. These extra stops waste power.

It is also well to have the railway management and the city authorities make every effort to eliminate all stops on cars going up hill and around curves. Every effort should be made to see that stops at these points are reduced to the absolute minimum as excessive power is required for this operation.

It is desirable to reduce the heating on the street cars. Approximately one-sixth of the operating fuel during the winter months is consumed in heating cars. In this war emergency the Fuel Administration desires that this heating be eliminated, except in very cold weather, and then only sufficient heating be used to take off the chill. In many cases cars have two points of heat, and it is suggested in these cases that the heaters be connected in series. Local municipal authorities and the railway companies are requested to work together on this and reduce the power consumption used for heat to a point that will be reasonable and not endanger public health or cause actual discomfort.

All municipal authorities are urged to do everything they can to reduce the number of stops made by the interurban cars, especially within city limits. In a number of cities ordinances require these large cars, or in some cases, trains, to stop at a number of street intersections. These large cars require three to four times more power to start than do city cars of moderate size.

Yours very truly,
UNITED STATES FUEL ADMINISTRATION.

Exhibit III

LETTER TO ELECTRIC RAILWAY COMPANIES

In order to save fuel, the United States Fuel Administration has advocated the use of the skip-stop system on all electric railways in cities of 25,000 population and over.

To have the public understand the problem and give us their support, we are sending you a number of posters which read:

Support the Skip Stop

> It will save 1,500,000 tons of coal per year.
> More coal means more steel.
> More steel means more guns and ammunition.
> More guns and ammunition, a shorter war and fewer casualties.
>
> UNITED STATES FUEL ADMINISTRATION.

We request that you paste these posters in some conspicuous place in all passenger cars operating in city service.

The United States Fuel Administration requests you to give this your personal attention and to see that the skip-stop service is operated so as to give satisfaction to the public. By so doing you will be rendering a patriotic service.

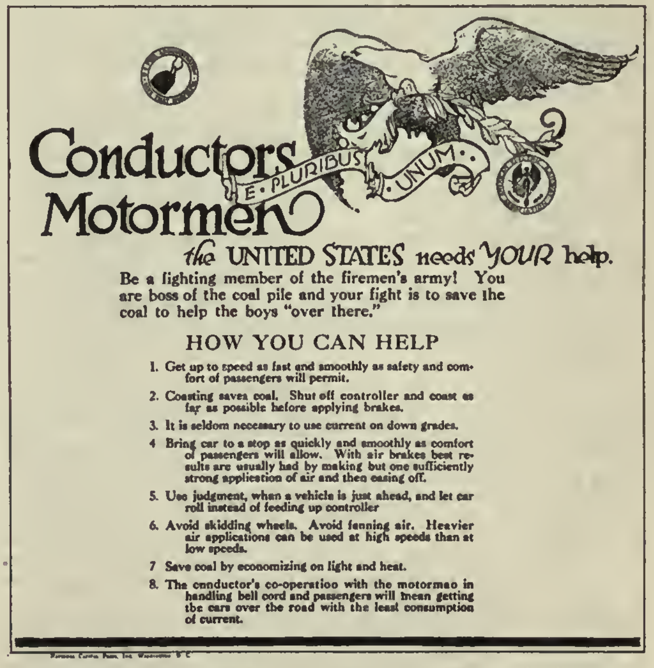
Yours very truly,
UNITED STATES FUEL ADMINISTRATION.

Exhibit IV

SUGGESTIONS TO BE CONSIDERED IN ADOPTING THE SKIP-STOP SYSTEM IN ORDER THAT MAXIMUM FUEL SAVING AND REASONABLE IMPROVEMENT IN SERVICE MAY BE OBTAINED

In adopting the skip-stop system as a fuel-saving measure during the war, there are three fundamental principles which must be observed in order that the proper results may be assured. These are as follows:

A. The system must be applied to the entire city, including the business district as well as the residence district, and not merely to the latter.


Conductors
Motormen
E PLURIBUS UNUM

the UNITED STATES needs YOUR help.

Be a fighting member of the firemen's army! You are boss of the coal pile and your fight is to save the coal to help the boys "over there."

HOW YOU CAN HELP

1. Get up to speed as fast and smoothly as safety and comfort of passengers will permit.
2. Coasting saves coal. Shut off controller and coast as far as possible before applying brakes.
3. It is seldom necessary to use current on down grades.
4 Bring car to a stop as quickly and smoothly as comfort of passengers will allow. With air brakes best results are usually had by making but one sufficiently strong application of air and then easing off.
5. Use judgment, when a vehicle is just ahead, and let car roll instead of feeding up controller
6. Avoid skidding wheels. Avoid fanning air. Heavier air applications can be used at high speeds than at low speeds.
7 Save coal by economizing on light and heat.
8. The conductor's co-operation with the motorman in handling bell cord and passengers will mean getting the cars over the road with the least consumption of current.

CAR POSTER TO REMIND CREW OF MEANS AVAILABLE FOR SAVING ENERGY

B. The stopping points must be located so as to serve the people to the best advantage rather than to secure uniform spacing or to follow any arbitrary rule. This may bring some of the stopping points on the near side of the street, some on the far side, and some in the middle of a block. It is better, however, to have such a diversity, with the points properly located, than to have uniformity if convenience of location is sacrificed to secure this result.

C. The number of stopping points must not be too great. There should be not more than eight per mile (averaging 660 ft. apart) in business districts, six per mile (averaging 880 ft. apart) in residence districts and four per mile (averaging 1320 ft. apart) in the open country.

The remarkable improvement in the service which has been effected in Washington by the skip-stop system has been largely due to the proper observance of these principles.

In addition to the above, which may be regarded as fundamental, there are a number of other items which should be carefully considered in each case, but which, on account of local conditions, may or may not apply. These are:

1. If the system is inaugurated gradually instead of all at once, it is preferable to put it into effect first in the congested downtown districts where a number of lines converge and to make it apply to all of the lines in that district. This will effect an immediate improvement in service on all of the lines and will prepare the way for a greater improvement when the system is extended.

2. The stopping points should be plainly marked, preferably by signs bearing the words "Car Stop Entrance" or some similar designation which will be clear to anyone rather than merely by a colored stripe on the pole or other designation which is not self-explanatory.

3. There should be a sign in each car giving a list of the points at which stops are made, where this is practicable, or, where this is not practicable, calling attention to the fact that the car stops only at certain streets and suggesting that passengers find from the conductor the nearest stop to their destination.

4. Where lines diverge, the stopping points should be located so that the stopping of cars of one line will not hold back cars of the other line. A typical instance is where one line continues on a given street while a second line follows the same route for a portion of the distance and then turns into a side street. In such a case, if the cars of the first line stop in both directions beyond the point where the second line turns off and if the cars of the second line stop in both directions on the street which they alone use, the above object will be attained.

5. In many cases a staggered arrangement of stopping points, so that if the cars bound in one direction stop at First Street, Third Street, etc., those bound in the other direction will stop at Fourth Street, Second Street, etc., will distribute the advantages of the system in a more equitable manner among all of the patrons than an arrangement by which the cars stop at a given point in both directions and skip the next former stopping point entirely. There are other cases, however, where this arrangement is not practicable.

6. In connection with the introduction of the skip-stop system the matter of safety stops should be carefully reviewed. There are many points at which cars are now required to come to a standstill where equally safe operation can be obtained merely by having them slow down to a speed of 5 or 6 m.p.h.

7. Where interurban cars enter cities, it is desirable that they should not be required to stop at every city car-stopping point (since such cars require much more power for starting than the city cars) but they should stop not oftener than every quarter mile. This can readily be arranged for by the use of special signs at the interurban car-stopping points.

8. By observing the above policies it is ordinarily possible, when introducing the skip-stop system, to reduce the number of stopping points on city lines by from 30 to 40 per cent. This usually reduces the number of stops actually made by about 25 per cent. Under these circumstances the schedule speed of the cars can, as a rule, be increased by from 10 to 12 per cent (without any increase in the maximum speed) while at the same time the power required (and hence the fuel) is reduced by a corresponding amount.

9. It has been more or less common, in introducing the skip-stop system, to begin with one or two lines and to reduce the stopping points only in the outlying sections, making all stops as usual in the business district. Such an arrangement does not give satisfactory results from the standpoint of either fuel economy or improvement in service. It is in the effort to avoid the introduction of the system on such a basis in any future cases that we are calling especial attention to the above principles which it is necessary to follow in order to secure the desired results.

10. Where single track is operated it is suggested that every other corner be skipped; that is, assuming that the streets are numbered 1st, 2d, 3d, 4th, 5th and 6th, to have the stopping places shown at 1st, 3d and 5th streets. In this way, confusion with reference to the placing of stop signs will be eliminated. This will reduce confusion in knowing where the car stops are located.

11. All stops should be carefully marked. Where it is necessary to start the skip-stop system immediately and regular signs are not ready, in a number of cases temporary signs are used.

12. Previous to starting the skip-stop system the fullest publicity should be given to the established stopping places. This should appear in the daily papers supplemented by notices placed in the cars whenever practicable.

Exhibit V

BULLETIN No. 29 OF THE AMERICAN ELECTRIC RAILWAY ASSOCIATION WAR BOARD ON SKIP-STOPS

The following letter has been received from the United States Fuel Administration regarding the operation and progress of the skip-stop system:

Washington, D. C., Aug. 29, 1918.

Mr. E. C. Faber, Manager,
American Electric Railway Association War Board,
950 Munsey Building,
Washington, D. C.

Dear Sir:

War's excessive coal demands increasing from day to day, require us to conserve fuel in every possible way. Practically all of the industries of the country are saving fuel. Electric railway skip-stop operation presents one of the largest fields for fuel savings. The Fuel Administration urges that skip-stop service be adopted in the United States in cities having a population of 25,000 or above. The fuel savings effected by this system will be at least 1,500,000 tons annually. We therefore request all electric railways to co-operate fully with the Fuel Administration in its efforts to save coal through the skip-stop system.

We are sending letters to the State Fuel Administrators, who will in turn communicate with the public service commissioners, mayors, city councilmen, and all others who regulate our public utilities, asking them to assist in putting the skip-stop system into effect Sept. 15, 1918.

Posters will be distributed to railway companies with instructions to insert them in prominent places in city cars. The posters contain a patriotic appeal to the public, asking them to support the skip-stop system, and explaining why it is an essential war measure.

Using the skip-stop system generally enables cars to be operated at 10 to 12 per cent higher schedule speed. The power saving varies from 8 to 16 per cent. Inasmuch as the cars operate at the higher schedule speed, it can be seen that the same service can be given with a lesser number of cars; or, providing the service warrants it, more service can be given with the same cars.

The importance of having the full co-operation of railway companies in making the skip-stop system a success in every city cannot be emphasized too strongly. This request from the United States Fuel Administration to the State Fuel Administrators and all public officials concerned, is merely to have the skip-stop system operative during the period of the war. The continuance of this economic method will in all probability depend upon the way the plan is carried out by the individual railway companies.

The railways and public officials are also being requested to eliminate stops on up-grades wherever it is at all practicable. These same officials are also being requested to eliminate all possible stops of interurban cars in cities, towns and villages.

We are addressing this letter to you as the representative of the electric railway industry. We expect the American Electric Railway Association War Board to aid in every way possible in securing the maximum fuel savings that are consistent with proper railway service.

We believe it is the patriotic duty of all railway men and of the individual members of the community to conserve fuel and man power by adopting the skip-stop system.

UNITED STATES FUEL ADMINISTRATION.

Electric Freight Haulage Is an Economic Duty

Such Service Is Invaluable to City and Country—The Field Is Practically Unlimited, and the Service Can Be Developed by Making a Traffic Analysis, Providing the Proper Equipment, "Selling the Product" and Using Farsightedness and Imagination

BY A. B. COLE
Westinghouse Electric & Manufacturing Company

A. B. COLE

Although but nine years out of college, Mr. Cole is well known in the electrical field through his surveys of railway freight conditions, and his recent work for the Electric Railway War Board during the past year. After graduating from Purdue University in 1909, he first acquired practical experience in the Westinghouse shops and engineering and sales departments, later working his way upward through several divisions of the same company's publicity organization. He is now assistant manager of that department, with headquarters at Pittsburgh.

UNQUESTIONABLY it is the duty of electric railways to give the public the best possible service. Therefore, it would be well for them to look very carefully into the question of public demands and the profitableness of freight business.

Few lines would flatly say that it is profitable to handle freight. Most of them, however, would consider freight business profitable if they had "proper facilities," belts around cities and towns, freight houses, team tracks and steam road connections. In other words, they do not consider the business to be at present on a profitable basis, but they realize what is required to make it so. This entire view is somewhat pessimistic. Electric railways have a field entirely their own, and they are capable of giving service far superior to that of competitors.

The electric railway has done more than all other transportation agencies to improve social life among both city and country dwellers, but it has met only a part of its possibilities as a conveyor and distributer of natural and manufactured goods. The electric railway, in fact, is in a position to do more to place the produce of the farm at the door of the consumer with greater dispatch and less cost than can be done by any other means of transportation.

This closer co-operation with the farmer has been found profitable by many electric lines in more ways than one. For example, there is the good-will which now means so much to a utility, and the increase in tonnage that is bound to come with better crops and stock from more intensive and efficient operation. Through better transportation from the electric railway, the youth who formerly left the farm forever now hies himself off to the nearest agricultural college to become a modern farmer.

The modern electric railway brings the city to the front door of the farmer. There are thousands of farm dwellers who date the history of their success and prosperity from the day when the electric interurban first reached their territory. In the past it was the case of an early start with a two-horse team and a hard day's ride whenever it was necessary to get into the city for supplies or to the market. The advent of the electric interurban changed all this. The farmer now at any hour of the day finds it possible to board a fast electric train for a trip of a few hours to the city. He can ship his produce into the city every day in the week if desired, instead of holding it for the weekly trip. He is in a position to take advantage of the market for his various commodities. His children are enabled to enjoy the educational and social advantages of the city and at the same time retain their residences on the farm.

The electric railway has also proved of immediate value in bringing the school to the farm by the use of special trains with competent lecturers and demonstrators. The subjects covered are usually dairying, horticulture, hog raising, poultry husbandry and farm management. Exhibits include dairy cows, hogs and other stock which are to prove the points made by the lecturers. The cars furnished by the railway operate on a fixed schedule, advance notice of the "Farm Special" being sent to every farmer in the interested territory, to all newspapers, commercial bodies and station agents. Generally, too, the merchants at towns along the way encourage the farmers to attend these "specials." The experts, who are drawn from the nearest schools, include specialists in everything from silos to eggs.

The producing character of some districts so visited has greatly changed because of profitable advice given and followed. Thus, one district was devoted almost entirely to grain. Through the educational talks, the farmers saw that dairying, hog raising, and fruit raising would be more desirable occupations, because of conditions peculiar to their territory.

In addition to the farm specials, electric railways which sell power have run "Electricity on the Farm" and "Home" specials to demonstrate the use of electrically-operated farm tools and electric lighting. Unfortunately, such practices have not been the rule. On many roads the freight business, like Topsy, "jes growed" with no general policy of development that would bring out the uttermost possibilities of the territory.

The advantages arising from electric railway service, however, do not lie solely with the farmers. The city dweller and the city merchant, for example, both profit by having the farm brought to their front door. The interurban railway brings in farm products fresh every day. They do not grow stale in transit but reach the city markets early the same day that they are shipped.

In general the electric railway is considered an advantage to the community. In many instances where electric railway service has been present the city merchants concede an increase of 10, 20 and 25 per cent in their business over a period of years, and in some cases the business has been of such noteworthy importance that it is only a question of time before the old crossroads stores will go out of business, as the farmers prefer generally to trade in the larger towns. Moreover, the electric service allows the storekeepers in the smaller outlying towns to carry smaller stocks and thus not tie up so much capital.

Specimen comments regarding the value of the electric lines follow: "They build up the towns, but turn trade to the cities"; "They give cheaper freight and more consideration of rights of shippers"; "They benefit all trading centers, large towns from smaller, and small towns from farmers"; and "They gradually, but surely concentrate retail trade in the large cities."

Electric Railways Are at Fault for Unpatronized Service

The electric railway excels in time of transit and in the handling of merchandise freight. In many instances cultivation by the railway traffic department and proper advertising, backed up by salesmanship, would soon make known the wonderful facilities of the electric railway as a freight carrier.

The problem before the electric railway in marketing its commodity is the same as that of a manufacturer who must break into the world market with a new product. He analyzes his field, and so must the electric railway in development of freight traffic. After proper analysis, the manufacturer launches an advertising campaign, backed by expert merchandising knowledge of the particular fields to be exploited. The electric railway must do likewise.

Interurban Lines Need Awakening

Despite the proved value of electric lines to the farmers and city dwellers alike, such carriers have not made full use of their opportunities for developing freight traffic. A railroad commissioner's view of the situation is summed up as follows:

> Apparently interurban interests have never fully awakened to the possibilities of freight transportation. Their facilities are not commensurate with the opportunity, and the managements do not seem to have enough confidence in the future to provide for possible expansion.
>
> The operation of single-unit trains is really an economic waste, in that it makes the unit cost of transportation a great deal higher than it should be. There is business in sight enough to justify multiple-unit trains in freight transportation on practically every interurban in the country—even though the bulk of the freight be not considered.
>
> If the interurbans were to make a reasonably adequate effort to secure and handle bulk freight, the revenue derivable from freight transportation should be multiplied several times, as compared with present returns.
>
> If the interurban railways do not soon awaken to the situation and provide more adequate facilities, it is among the possibilities that they will lose a great deal of the possible business to the several trunk lines, because of the inadequacy of interurban transportation.
>
> Surveys made by various bodies on account of the freight congestion and the delay of steam railroad movement of l.c.l. freight, show unquestionably that the interurban railways can be of good service to the country. They can relieve to a large extent the congestion of millions of tons of freight and thereby increase the car supply.

In its case the fields to be exploited are, to speak broadly, carload freight, less-than-carload freight, and parcel dispatch. All three of these divisions, of course, are subdivided depending on the kinds of industries touched.

To carry the merchandising parallel further, the manufacturer backs up his advertising campaign with expert salesmanship. In the case of the electric railway, these expert salesmen should be well-paid representatives of the traffic department under a high-grade, well-paid, experienced traffic manager. It is a well-known fact that the sales managers of first-class organizations are often the highest type of man in the personnel. This should be true in the case of a traffic officer, and in order to obtain such talent he must receive a salary commensurate with his ability.

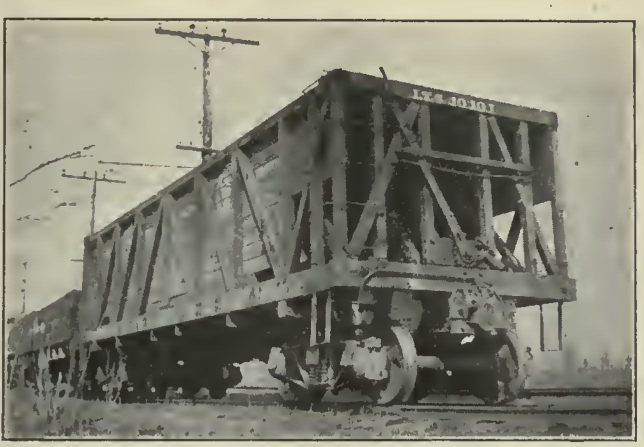
Advertising and salesmanship of the manufacturer must be backed by its service from the main works; otherwise this expensive talent is wasted. The electric railway is in a position to give service superior to that of its competitors, barring none, but unfortunately the electric railway has failed to tell the public of this uncomparable service. Electric railways are to blame for their unpatronized freight service.

Economic Fallacy of the Motor Truck

Motor-truck and electric railway facilities should be co-ordinated. The motor truck has practiced camouflage, and the electric railway stands by and permits this competitor to take the very cream of its traffic. Short-haul tonnage is now being hauled by motor truck—a traffic which really belongs to the electric railway, for the motor truck is economical over a very short distance comparatively. Yet the public has failed to recognize the true economic value of the electric railway. Why? Because the majority of electric railways when promoted are not backed by the proper imagination and far-sightedness, which in turn would demand the aggressive methods needed to make known to the public the merits of such an incomparable service.

So true is this that many chambers of commerce, boards of trade and other commercial bodies are helping to develop motor-truck haulage, failing to realize that this expensive system of transportation is entirely inadequate to meet the ultimate demands, while cheaper and better facilities—the electric railways—are available.

According to motor-truck promotion literature, the "star of the motor truck is only peeping above the economical horizon." The essential difference between the hauling of large volumes of freight by rail and similar volumes by motor trucks, it is said, is that in the first instance the rights-of-way represent private investments, while in the latter case the rights-of-way are public property. But even on this basis an analysis will prove the economic fallacy of the motor truck for freight haulage, in that with its unrestricted use, there could be nothing less than a maximum of waste in man-power and maintenance—in additional men for up-keep of roads, in increased demand for repair parts and in gasoline needed for other industries. The winter of 1917-18 in many instances demonstrated the value of electric freight haulage. In some localities, where the weather was particularly severe, the electric railway showed its superiority by keeping traffic open and "delivering the goods," when the steam roads and motor trucks were at a standstill. In one instance, the electric line not only took care of the local passenger service when the steam roads were tied up, but it hauled meat, milk, coal and other necessities to the towns within its territory, thereby saving the communities from serious inconvenience if not a real famine. This service will not soon be forgotten by the patrons. If electric roads can deliver the goods under such extreme conditions, it is obvious that they can more than make good under normal conditions.



SPECIAL EQUIPMENT OF ILLINOIS TRACTION SYSTEM

STEAM AND ELECTRIC RATES NOT FAIRLY COMPARABLE

Having realized the folly of their original low rates, many electric railways have asked for, and occasionally secured, increased rates based upon the steam-railroad classifications. As a rule these electric lines have waited for the steam competitors to take the initiative. With regard to the broad principle of rate-making, however, the electric railways have rarely fought for a special classification based upon their superior service.

"Express service at freight rates" is an old slogan that has proved to be the downfall of many an interurban. With proper publicity, the public would pay the higher price that better service deserves. Such factors as early-morning delivery of overnight shipments and accessibility to stations entitles the electric railway to a differential wherever speed is the essence of the contract.

Recent study has clearly disclosed the fact that both public utility commissions and chambers of commerce appreciate these inherent reasons for higher rates. In fact, they have stated that electric service is often worth at least 25 per cent more than steam service to the same destination. From this is would seem that if the railways developed more salesmanship in marketing their superior product of freight transportation, they could build up more business regardless of steam rates.

The field to which electric freight transportation may be offered is practically unlimited, and many lines now are engaged in an extensive business, accepting anything for transit that a steam line would. Noteworthy examples of this practice are the Waterloo, Cedar Rapids & Northern Railway, the Inter-Urban Railway of Des Moines, the Michigan Railway, the Toledo & Western R.R., the Fort Dodge, Des Moines & Southern Railroad and the Youngstown & Ohio River Railroad. There are also some roads which perform special service, such as industrial switching between steam roads and industries, while others handle primarily one principal commodity, such as coal. An example of the former type of road is the Niagara Junction Railway, and of the latter Bellville Electric Railway.

Moreover, there are other roads that are just breaking into the heavy haulage business, such as the Detroit United Railway, the Chicago, North Shore & Milwaukee Railroad and the Chicago, Lake Shore & South Bend Railway. All of the foregoing handle freight with electric locomotives and motor-freight cars. The heavy interurban roads are also found handling a tremendous tonnage, principally of merchandise both l.c.l. and c.l., and here we find solely motor-freight car and trailer operation with practically no steam railroad interchange. Notable examples of this type are the Ohio Electric Railway, the Union Traction Company of Indiana, the Northern Ohio Traction & Light

SPECIAL AUTOMOBILE CAR OF CEDAR VALLEY LINE

Company, the Cleveland, Southwestern & Columbus Railway, the Grand Rapids, Grand Haven & Muskegon Railway, the Pittsburgh, Harmony, Butler & New Castle Railway and the Terre Haute, Indianapolis & Eastern Traction Company. An embryo freight road, about ready to develop its territory, is found in the East St. Louis & Suburban Railway.

The commodities handled by electric lines may be divided into several general classes, as follows:

Products of agriculture
Products of animals
Products of mines
Products of forests
Manufacturers
Merchandise and other commodities
Merchandise not included in the above

The term freight haulage does not necessarily apply to package freight or l.c.l. lots, as almost every interurban electric railway is doing a considerable amount of this business. What many electric lines have not fully developed is the handling of carload freight, which is the mainstay of the steam railroads. An example of what is possible on a 35-mile interurban line is shown from the following statement of commodities handled in one year:

Stone	816 cars	Pipe	21 cars
Coal	240 cars	Horses	20 cars
Hay	226 cars	Bolts	19 cars
Tomatoes	51 cars	Brick	18 cars
Tomato crates	46 cars	Tile	15 cars
Miscellaneous	42 cars	Lumber	11 cars
Wheat	27 cars	Milk	6 cars
Oats	22 cars		

The accompanying tables give further data of this sort. Table I shows the tonnage record by commodities for the Salt Lake & Utah Railroad during 1917. Tables II and III give respectively specimen operating statistics of this railway for the month of February, 1917, and data showing the conditions of operation of this company.

HOW TO DEVELOP FREIGHT SERVICE

The interurban is no longer the proverbial "shoe string railway" that ran somewhere out into the country, but a well organized railway capable of rendering valuable economic service to its territory. While many lines were developed primarily for passenger business, some of these can readily help relieve traffic congestion and improve their load factors by hauling freight. To this end they should:

1. Make a traffic survey.
2. Develop dairy traffic handled by freight-motor cars.
3. Encourage merchandise shipments, handled in less than carloads or carload shipments by locomotives or motor cars and trailers.
4. Relieve steam railroads of local traffic.
5. Develop steam-railroad interchange.
6. Establish sidings and belt-lines, where possible, for industrial development.
7. Cultivate commercial bodies in their territory, and demonstrate the possibilities of electric service.

While freight haulage in its expanded form may call for the use of such special equipment as is shown by the accompanying illustrations of an automobile car on

TABLE I—TONNAGE OF COMMODITIES HANDLED BY SALT LAKE & UTAH RAILROAD DURING 1917

Commodity	January	February	March	April	May	June	July	August	September	October	November	December	Total
Automobiles			37	23	25	23		5	6	6	7	6	138
Beets	1,521	29		348	88					12,078	10,881	7,916	32,861
Brick							63		20			20	103
Building materials									82				82
Canned goods	25		46		27				54	54	205	163	574
Cans					23	25	12	49	63	34			206
Cattle													
Cement			231	181	374	269	224	266	142	178	118		2,003
Coal	490	783	885	504	683	637	664	1,240	4,367	3,371	1,173	4,085	18,882
Coke				56		29		25		24		246	380
Electrical supplies		15			15			15		15		15	75
Explosives													
Fire clay		20		20				30	32				102
Flour				30	37				20	49	25	67	228
Fruit									2,914	591	133		3,638
Grain		87	69	151	315	81	29	20	132	100	160	15	1,159
Hay	12	91	217	227	43			19	121	68	23	220	1,041
Limestone								36			100	283	419
Lumber	362	137	219	459	478	1,152	688	787	556	250	111	289	5,488
Machinery					23	33		80	70	70	6		282
Merchandise	487	589	892	824	825	810	720	948	999	984	654	748	9,480
Miscellaneous	30	100	37	12	124	105	139	41	227	231	99	46	1,191
Ores										20			20
Potatoes		198	98	112					18	613	272	105	1,416
Rail				18	162	414	360	90	18			39	1,101
Salt	75	57	88	47	41			23	45	49	50	31	506
Steel				110	37	24		31	36		21	70	329
Sugar	1,324	2,027	2,442	427	5	53	48	80	141	2,664	935	771	10,917
Sewer pipe	27				7								34
Ties		40	118	71	221	739	766	808	149	50	20		2,962
Tile													
Track material							7		18				25
Vehicles													
Vegetables									282	272	142	215	911
Poles	227	114	50	34	68	40	103	20	40			30	726
Cereal	15			18									33
Corn	37	51											88
Syrup	181	70	72		55				359	612	194	627	2.120
Junk		21	36	158	80	62	42	65	58				502
Iron pipe			188	79		6			38	35		44	390
Wire		37	57	8	35				11				148
Agricultural implements		30	39	115	28	33	22		13				280
Slags				99									99
Beet seed				64			29	15					108
Wagons				28						23		17	68
Iron				80	43	40				16			179
Mill stuff		15	17								21	26	79
Freight cars					162	60	12	12		220			466
Boxes						55	49		36	24	15		179
Spikes						66							66
Horses							14						14
Soda ash							58						58
Silo								279	36				315
Oil								17					17
Shooks								110		29			139
Baskets								80	59				139
Asphalt										316	76		392
Total	4,813	4,511	5,838	4,283	4,024	4,776	4,049	5,179	11,174	23,026	15,441	16,094	103,208

the Waterloo, Cedar Falls & Northern Railway and a coal car of the Illinois Traction System, it requires only simple equipment to begin the handling of local freight. Many a road has started by using one or two freight motor cars, each able to haul three or four trailers. As business grew, one or two freight locomotives were secured. Motive power equipment is available which has such characteristics that operating an "off-peak" freight service would not necessarily require any additional substation, power house or feeder capacity or in anyway interfere with regular traffic. Low-speed field-control locomotive motors can handle heavy drags of freight cars with no greater power demands than those required by a single high-speed large interurban car.

One of the secrets of the rapid and extensive growth of freight business on some electric lines is that they have complete traffic arrangements with steam and electric connecting lines, and a well-organized method of securing business. Invariably, too, it is found that the electric railways which do the heaviest freight business usually have former steam railroad men in charge of this branch. With the nationalization of the steam railroads there should be available for re-employment some steam traffic men who could easily prove invaluable to any electric railway which wants to build up its freight business. Such men not only know how to secure business and move traffic; they are also familiar with the complex practices peculiar to steam railroad interchange of traffic and equipment.

The disease of "localism," or deliberately building non-interchangeable equipment, must be cured if the electric railway wants to do more than a village business. In several instances it has been found that through a mistaken sense of standardization the policy of the mechanical department actually hindered the development of inter-line freight business. For example, because one property was using the same type of coupler on both passenger and freight cars it could not handle M. C. B.-equipped cars in interchange. Some roads discourage interchange because of their unwillingness to have their rolling stock travel on foreign electric lines, being quite devoid apparently of consideration for the meaning and the value of car interchange pooling practice.

These points, although small in themselves, are very important in connection with the development of electric freight on a large scale. It is neglect of points of this kind that causes steam railroads to fail to deliver a car at the designated place on the electric line, despite

TABLE II—SPECIMEN OPERATING STATISTICS OF SALT LAKE & UTAH RAILROAD FOR MONTH OF FEBRUARY, 1917

Freight Statistics

Number of tons of freight carried earning revenue	4,511
Number of tons of freight carried one mile	72,020
Number of tons of freight carried one mile per mile of road	1,081
Average distance haul of one ton	15.9
Average amount received for each ton of freight	$0.96874
Freight revenue per mile of road	$65.61531
Freight revenue per train-mile	$1.25430
Freight revenue per ton per mile	$0.06068
Average number of tons of freight per loaded car-mile	5.1
Average number of freight cars per train-mile	5.1
Average number of loaded cars per train-mile	4.1
Average number of empty cars per train-mile	1.0
Average mileage operated during month	66.6
Average operating cost per ton per mile	$0.06825
Average operating cost per freight train-mile	$1.41090

Miscellaneous Statistics

Revenue from transportation per car-mile	$0.49535
Revenue from transportation per car-hour	$8.40951
Revenue from transportation per train-mile	$0.73323
Revenue from other railway operations per car-mile	$0.00963
Revenue from other railway operations per car-hour	$0.16685
Operating revenues per car-mile	$0.50518
Operating revenues per car-hour	$8.57634
Operating revenues per train-mile	$0.74781
Operating revenues per mile of road	$476.07702
Net operating revenues per car-mile	$0.13012
Net operating revenues per car-hour	$2.20909
Net operating revenues per train-mile	$0.19262
Gross operating expenses per car-mile	$0.38751
Gross operating expenses per car-hour	$6.57877
Gross operating expenses per train-mile	$0.57364
Gross operating expenses per mile of road	$365.19099
Freight, mail and express car mileage	17,795
Freight, mail and express car-hours	1,852
Maintenance of way per mile of track	$73.34
Average maintenance cost per passenger car	$23.99
Average maintenance cost per freight car	$4.16
Average maintenance cost per car of electric motive power	$29.90
Station and terminal expense per passenger-mile	$0.00193
Station and terminal expense per ton-mile	$0.02509
Maintenance not dependent on train movement per mile of road	$67.39
Per cent of freight revenue, loss and damage freight	0.01501

Passenger Statistics

Regular fare passengers carried	52,396
Revenue transfer passengers carried	....
Free transfer passengers carried	....
Average number of passengers per car-mile	19.2
Average number of passengers per train-mile	22.2
Average number of passenger cars per train-mile	1.2
Revenue passengers carried 1 mile	862,072
Revenue passengers carried one mile per mile of road	12,944
Average distance each passenger carried	16.4
Average fare received from each passenger	$0.39724
Average passenger train revenue per mile of road	$312.52147
Average passenger-mile revenue	$0.02416
Average passenger-mile operating costs	$0.01317
Passenger car mileage	44,968
Passenger car-hours	1,745
Average operating cost per passenger car-mile	$0.25248
Average operating cost per passenger train-mile	$0.29177
Average passenger revenue per car-mile	$0.46286
Average passenger revenue per train-mile	$0.53486

TABLE III—DATA SHOWING OPERATING CONDITIONS OF SALT LAKE & UTAH RAILROAD

Utah-Idaho Sugar Company's Beet Loading Platforms and Tracks:

Granger
Norberg
Lehi
Salem
Harmon
Redwood
Manila
Bello
Riverton
Springville
Fifteenth South
Bluffdale
Keeler

Industries Served Through Connecting Lines:

All industries in; Salt Lake City and Provo, other than are reached directly by the tracks of the Salt Lake & Utah Railroad, are served through reciprocal switching agreements between this road and steam roads.

Routes and Rates:

Through routing and rates are in effect with all lines in connection with the Union Pacific System, thus giving the industries located on our tracks all the benefit of their rates and routing.

Proportion of Intrastate and Interstate Freight Business:

(65 per cent intrastate and 35 per cent interstate)

During the calendar year of 1917, the Salt Lake & Utah Railroad handled 1708 carloads moving on interline rates:

	Carloads
Coal	462
Grain and hay	46
Green fruit	294
Lumber and forest products	231
Potatoes	41
Sugar and syrup	325
Miscellaneous	311

In addition to the carload interline business, more than 2,000,000 pounds of interline package freight was handled.

For the same period, the handling of purely local freight, *i. e.*, freight picked up and laid down along the line, approximated 1,500 carloads of solid carload freight, and 18,000,000 pounds of less than carload freight.

Passenger:

No interline business.

Equipment Owned:

Freight Equipment:

	Tons Capacity
Three electric locomotives	750
Twenty-six box cars	60,000
Twenty all steel side dump gondola cars	100,000
Ten beet cars	80,000
Seven flat cars	60,000
Four refrigerator cars	80,000
Two freight cabooses	....

Passenger Equipment:

Two all-steel motor express cars
One all-steel trailer express cars
Eleven all-steel combined express and passenger motor cars
Four all-steel passenger coaches

Men employed...... 143

Fuel used.......... Hydroelectric power, purchased from the Utah Power & Light Company, and obtained by them from various mountain streams in Utah and Idaho.

billing instructions and regardless of the inconvenience to the consignee. If electric railways wish to deal with the steam railroads, they must play according to the rules of the game.

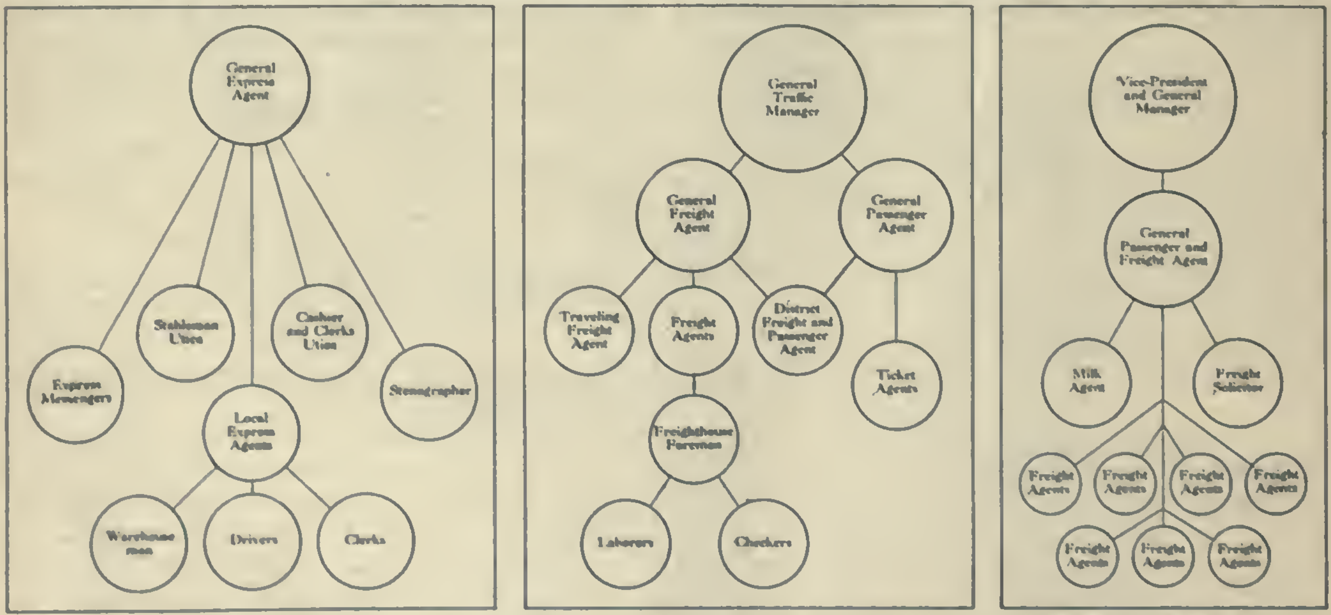
CHOOSING THE PROPER FREIGHT ORGANIZATION

The quantity of business and the methods by which it is handled naturally control the size and the character of a freight traffic organization. While steam railroads have a fairly standardized freight department regardless of size, the electric railways of the United States, when viewed from the goods-handling standpoint, are divided into six different classes, as follows:

1. Purely passenger lines.

2. Lines over which an old-line express company operates on a percentage basis (usually 55 per cent of receipts) and offers a wagon collection and delivery service at rates slightly above those fixed by steam roads for straight rail transportation.

3. Lines which have entered into agreements to form a co-operative express package company organized and operated as a separate corporation with wagon collection and delivery service and with rates practically equal to those of the old-line express company. For example, the Electric Package Express Company, Cleveland, Ohio.



New York State Railways Utica-Syracuse Lines

Detroit United Railway

Aurora, Elgin & Chicago Railroad

ORGANIZATION CHARTS OF FREIGHT-HANDLING ROADS

4. Lines which operate less-than-carload freight business at steam railroad rates with a dispatch service at twice first-class steam rates, as for material within the 100-lb. limit and carried upon passenger cars.

5. Lines which operate a general freight and express business including both carload and less-than-carload shipments, with interchange relations, carrying through rates with steam roads, but exclusive of a through freight business.

6. Lines operating a general freight business on exactly the same basis as steam railroads, and considered practically as electrically operated steam railroads. The Piedmont & Northern Lines, the Fort Dodge, Des Moines & Southern Railroad, the Inter-Urban Railway of Des Moines, the Waterloo, Cedar Falls & Northern Railway and the Toledo & Western Railway are examples. This class includes terminal, belt and switching lines, such as the Niagara Junction Railway, the Bush Terminal Railroad and the Hoboken Shore Road.

In each of the classes where freight or express is involved an entirely separate department with a special type of organization should be created. The accompanying organization charts are illustrative of methods now in use. The Detroit United Railway has heavy interurban l.c.l. freight traffic, while the Waterloo, Cedar Falls & Northern Railway has freight traffic similar to that under steam operation. The Aurora, Elgin & Chicago Railroad has a large amount of dispatch package freight, and the New York State Railways a considerable amount of pick-up and a large amount of parcel freight. The service on these two lines is more or less alike, the main difference lying in the rapid transit of the former.

HINTS FOR ORGANIZATION

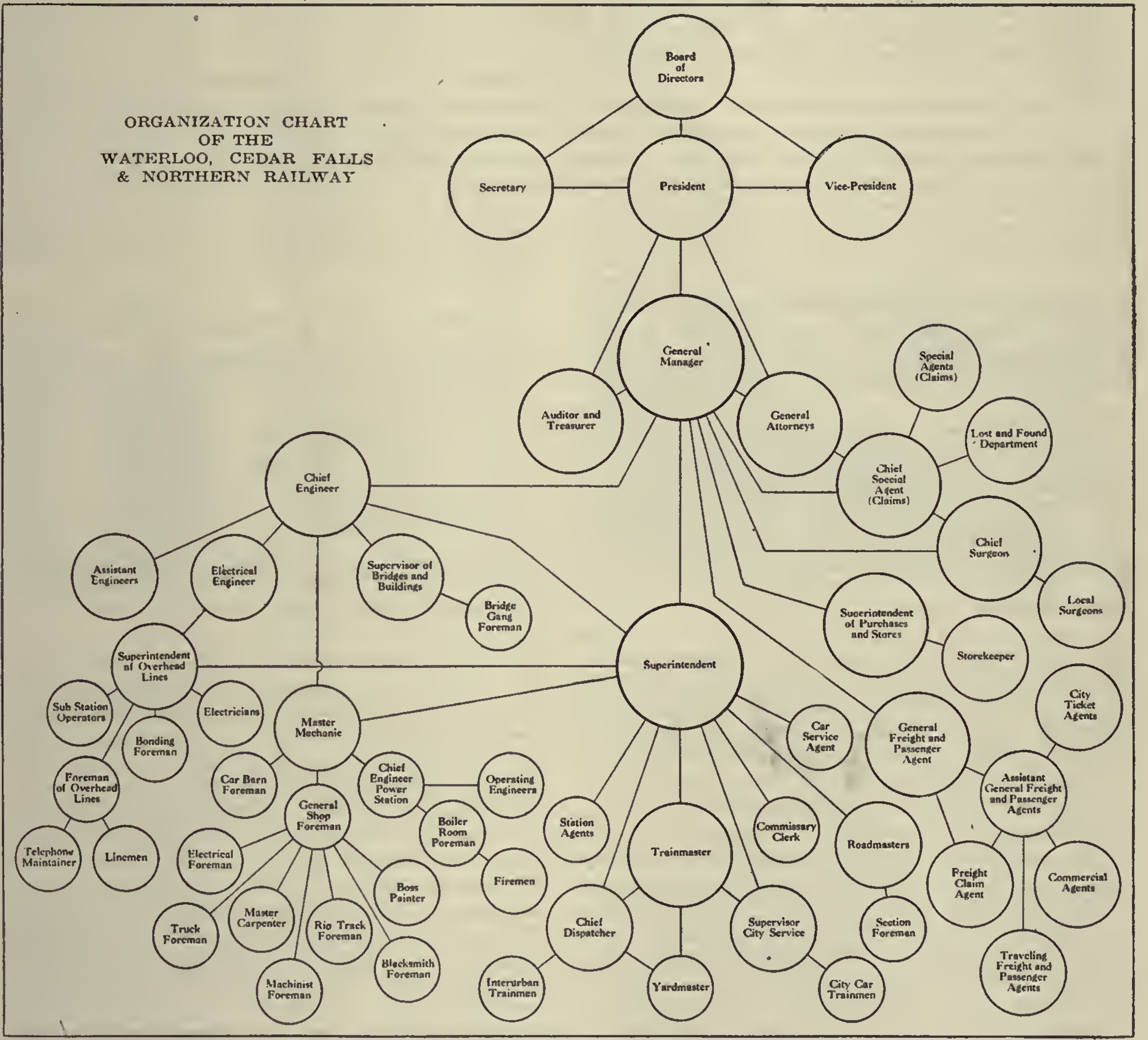
Where a line has been operating a strictly local freight and express, the ideal organization would include a general freight and passenger agent in charge of the securing of business and the general handling of material to and from cars. His duties are such that the freight business need not be separated from passenger business except in routine matters, and the latter may be handled by clerks. This official should be the court of last resort in all traffic matters, including the direction of all division agents, advertising, issuance of tariffs, etc. He should be in close touch with all industrial, commercial and trade organizations. He must also be familiar with such transportation as relates to the handling of regular and special trains. Through his acquaintance with shippers and the methods of billing and handling in transit, he can give excellent counsel to claim investigators, who may work under his supervision or under that of the auditing department.

Enough district freight and passenger agents to cover the territory should be appointed by this general freight and passenger agent. These district agents must cultivate their respective sections to the extent of acquaintanceship with their large shippers and all prospects. In soliciting, agents should carry on an investigation along the following lines:

1. List all city and suburban points which require through freight service.

2. Determine the amount of outbound and inbound business to and from the heavy shipping points.

3. Prepare maps—one on a large scale to show each community; another on a smaller scale to show the surrounding country, and also one of company properties that may possibly be used for freight stations, including lots acquired.


ORGANIZATION CHART OF THE WATERLOO, CEDAR FALLS & NORTHERN RAILWAY

4. Show on the maps the distance of the commercial center or the center of the city from all proposed freight stations, and note the corresponding distance of steam stations. Map also all prominent houses, bakeries, markets, packing houses, factories, quarries, sand pits, dairies, truck gardens, large farms, mines, grain elevators and other sources of traffic—these items may be catalogued on the maps by number or symbol and indexed later by a clerk in the office of the general traffic agent. Learn and record the special requirements of each shipper.

5. In farm and orchard sections, learn in advance what the car requirements of each producer will be at the stated crop time. Such data of forehandedness should be indexed.

6. On completing these surveys, record and map the expected tonnages to predetermine the economical equipment required in beginning freight service.

The district agent should act in an advisory capacity to the local or way station agent, who usually knows his public's whims and fancies. All matters regarding the handling and the delivery of freight through the warehouse and way station should come through the local agent under the district agent's supervision. The fact that several station agents are under the jurisdiction of one district agent permits comparison of respective efficiencies and is a general stimulus to improvement in getting and handling freight traffic.

At larger freight stations the personnel, in addition to the local agent and regular clerical help, usually includes day and night foremen who supervise the checkers, receiving clerks and truckers. These foremen report directly to the local agent. The job of warehouse foreman is not easy, and it is highly necessary that a man appointed to this position should have the tact to handle subordinates and teamsters.

The treatment of the teamster is particularly important, for he is the shipper's representative and often embodies the only contact that the railway may have with the customer for months. Therefore, facilities should be provided to enable the teamsters to deliver goods and secure receipts without delay. Much can be accomplished in securing their good will by properly paved driveways and adequate weather awnings or canopies.

It is also highly important that great care should be given to the movement of freight through the warehouse. Inferior men paid less than the steam railroad scale cause a large number of "overs" and "shorts" and also damage merchandise. The cost of better-paid men will more than offset the cost of dissatisfied customers and freight claims that often exceed the actual gross freight revenue. Claims may be kept down also by using an experienced man or stevedore to stow shipments into the cars. Where business is not too great, the local agent should supervise the loading of freight, thereby assuming personal responsibility for its condition and loading.

Usually the local or way-station agent reports to all the proper departments regarding matters under his supervision. His ability should be equal to or better than that of the steam agent in the same community. Where it would not be profitable to keep a salaried agent, a store-keeper whose place is near the station often will act as agent, his compensation being based on the quantity of business handled.

Current practice on many electric lines is to combine the job of agent with that of substation attendant. This is satisfactory only when the business through the station is small and non-competitive. Such an agent's first duty is that of substation attendant, and he should not be expected to solicit business, collect bills and make adjustments outside the station unless he has an assistant. With the advent of the automatic substation, this difficulty may eventually be eliminated.

At points where there is not enough business to warrant a station, many roads have some local teamster act as the local agent, meet all trains and make collections and deliveries of freight. This teamster-agent acts as a way-station agent except that he has nothing to do with the sale of tickets to passengers. As this service does not require all of his time, he is able to do general teaming.

After the traffic begins to develop it is usually found that the simple traffic organization outlined above cannot handle all the work. It must be enlarged and specialized. Generally the dairy business is the first to demand this attention. A dairy agent can go a long way toward increasing this traffic, not only by looking after the details but also by inducing the farmers to organize co-operative milk depots and by arranging for lectures by experts from local educational institutions on increased efficiency in dairy output. After this division has been established, use may be found for an industrial agent to organize farmers into elevator companies, interest manufacturers to locate their plants along the line, arrange for sidings to nearby plants, etc.

It may also be found necessary to employ an agent for soliciting freight. This agent may cover not only his own property but also that of competitive steam lines. He is especially valuable when able to secure the personal acquaintance of large shippers, even if he does not increase the local l.c.l. business. This can be better fostered by the local agent and his assistant, whose intimacy with the community leads them to be favored.

More business also leads to enlargement of the department for investigating and settling freight claims. The usual head of this department is a freight claim agent who reports directly to the general manager, since the results of his investigations often require that employees of other departments be disciplined. Enough claim investigators should be employed to permit expeditious handling of claims through personal investigation and correspondence. The shortest way to stop a claim is for the local and way-station agents to report all freight matters directly to the claim agent, with a copy to the traffic manager or other head of the traffic department.

A SPECIMEN GROWTH FROM SMALL BEGINNINGS

In developing any freight business, it seems logical to cultivate the local business first and then look for other territory to be served. A specific case of growth from small beginnings is the Waterloo, Cedar Falls & Northern Railway. This road was chartered originally in 1895, under the name of the Waterloo & Cedar Falls Rapid Transit Company. It adopted the present name in 1904, having in the meantime built up an extensive steam-road extension, of which one line of 33 miles was opened in 1903. In 1904 the company leased a 22-mile branch of the Chicago Great Western Railroad (steam) between Waverly and Sumner, Iowa.

In 1910, however, operation of the Chicago Great Western branch was discontinued, a line being built from Denver Junction to Waverly. In 1912 the company started a line from Waterloo to Cedar Rapids, completed it in September, 1914, and placed it in operation as a 1300-volt d.c. railway in March, 1915.

A few years ago this system had a very inadequate freight terminal in the city of Waterloo. It had traffic connection with but one steam line, which it reached only through the city streets. Freight cars could be handled only at night, and property owners protested. The management, realizing that good freight terminals were necessary to develop a large carload business, proceeded to build an outer belt line. This extends around the factory district of Waterloo and ties together all steam lines entering Waterloo. In connection with this belt line, trap-car service is operated to supplement the terminal freight operation in East Waterloo. The East Waterloo terminal is only five or six blocks from the principal business district of Waterloo.

At the terminal on the Denver Division, 17 miles north, connection is made with the Chicago Great Western Railroad to secure a shorter route to points north and west. A traffic agreement was entered into whereby freight directed to or coming from points north or west of Waterloo is turned over from the steam road to the electric line for handling. This agreement opened up a great territory for the jobbers and merchants of

Waterloo and enabled both the steam and electric lines to develop business in the new territory. It also helped the steam line to win competitive business which it had not been able to secure before on account of its inability to meet the time schedule of other steam lines.

REAL FREIGHT SALESMANSHIP

One of the small country towns on the Waterloo, Cedar Falls & Northern line was visited by a traffic officer. Through conversation with a bank cashier he learned that the bank was in correspondence with four or five farmers in Illinois with reference to securing farms at some point in Iowa. Following up this slight clue, the officer went to Illinois to see the farmers, expecting, if successful, to secure the haulage of six or seven carloads of household goods and farm implements. The farmers, impressed by such intelligent inquiry, became interested to the extent that they bought farms located at different points along the electric line. All these farmers were progressive men. One of the first things they did on occupying their new farms was to begin tiling them for drainage. The older farmers in this vicinity were so impressed that several hundred more cars of drain tile are shipped annually to this territory than in former years.

25 of these MODERN GRAIN ELEVATORS
on the ILLINOIS
TRACTION SYSTEM
(McKinley Lines)
give the producer the advantage of a short, quick, economical haul to the city market
28 of these POWERFUL ELECTRIC LOCOMOTIVES
at the SERVICE of SHIPPERS on the ILLINOIS TRACTION SYSTEM
(McKinley Lines)
1564
1566

BUILDING FREIGHT TRAFFIC WITH CAR CARDS ON THE I. T. S.

This line was further developed by keeping in touch with building contractors and men handling materials for new construction. By watching the award of contracts and following them up, it has been possible to secure the routing over the electric line of large quantities of brick, cement, plaster, hollow block, stone, sand, etc., purchased at points in the tributary territory.

In developing l.c.l. shipments, or package freight, a careful investigation was made of the shipments of milk and express parcels. When the Cedar Valley road placed in operation several years ago the line between Waterloo and Cedar Falls, and package freight was first handled, it was necessary to meet the competition of a dray line in order to get the business. The two towns were only 8 miles apart, but the slow dray service was well developed. A motor express car service of two round trips per day was installed. This service was well advertised. By degrees the dray competition was eliminated, so that now practically all the package freight between the two cities is handled by the interurban motor freight express cars at a great saving in time. This service is also handled in connection with the Chicago Great Western Railroad, shipments from Chicago into Cedar Falls aggregating a considerable amount daily.

In the factory district the electric line handles industrial shipments to and from the various points and from farms along the line, including milk shipments for city dairies. The milk, which is picked up at country road crossings by the passenger cars, is handled by the duplicate ticket arrangement, each milk can bearing a ticket of the required denomination. Milk tickets are on regular sale at any of the company's stations. At various country crossings several co-operative creameries deliver to the road their butter shipments for Chicago and New York. This traffic, which is handled in refrigerator cars, averages one or more cars a week throughout the year.

To speak strictly, the express business is handled by the American Express Company, which looks after the development of this line. Therefore the responsibility for handling express does not fall upon the railway.

The traffic department of the Waterloo, Cedar Falls & Northern Railway is headed by a general freight and passenger agent, who is in complete charge of all traffic. Under him are two assistant general freight and passenger agents at two important terminals, and a traveling freight agent who makes his headquarters at the largest terminal city. The assistant general freight and passenger agent at the headquarters of the railway is in charge of assigned special duties, while the other assistant has charge of the solicitation of traffic. The traveling freight agent makes all competitive towns on the system, and a general agent in a small city on one of the branches has charge of all local traffic solicitation there. Then come the usual way-station agents.

To secure business to and from any point in the United States the general freight and passenger agent spends about one-half of his time in visiting the various trunk-line points throughout the country. His work is followed up by special agents across the United States. These call upon those large manufacturers who prohibit trunk line solicitations but who may be prevailed upon to route via electric lines. Agents and representatives of foreign lines with whom the electric line has business are also visited. These remarks apply before government control went into effect.

Records compiled from information secured by the traffic department are used to keep track of both the volume and the origin of business. These records are kept according to firms, towns, comparison reports and information secured by personal contact with brokers.

In addition to the use of facilities like grain elevators and stockyards, several other excellent means new to freight business are pursued to increase traffic. Thus, competitive points are visited by the traveling freight agent to induce elevator men to ship their grain over the electric line. Milling-in-transit arrangements permit grain coming from points on the electric line, its trunk-line connections or other points in Iowa and surrounding states, to be milled in transit and then shipped to destination as a completed product. For instance, a carload of corn routed to Chicago via the electric line is set out at Cedar Rapids, milled into starch and then forwarded to destination on the original billing. Thus the electric line can offer every advantage of the steam railroad in addition to its superior speed.

Reciprocal switching arrangements between the electric line and all trunk lines making connections in cities served by the former enable business industries located on other roads to be handled as if they originated on the electric line itself. By this arrangement all classes of business can be solicited regardless of location. For example, a complete train of automobiles routed from a connecting steam railroad was shipped from Flint, Mich., to Waterloo, Iowa, via the electric line.

Very often the projectors of an electric railway will find in examining territory that little more than a few stagnant villages and some discouraged farmers exist, but a closer study of the country itself will often disclose an enormous number of verdant forests, undeveloped quarries, sand-pits, ice-producing lakes and promising fruit and dairy-lands. It is not enough for the railway men to consider furnishing merely the means of transportation for these products. It is just as important that they assist considerably in encouraging the investment of capital in order to exploit these resources so that a profitable outlet may be found for each product and dormant communities may be aroused to the new possibilities that stand before them.

FREIGHT SERVICE MUST BE ADVERTISED

While it has always been the custom of railroads, both steam and electric to advertise their passenger business elaborately, in many instances electric lines have failed to foster their freight business, by means of advertising and constructive publicity.

It is not sufficient to advertise on the time table that a company has fast freight service. It is important that other mediums be used. First of all a small double-column newspaper "ad" about 2 in. deep, run every day, is one form of keeping the service before the public.

Another good form is the use of car cards. A notable example is the case of the Illinois Traction System, which advertises its facilities, not only motive power, but also grain elevators. Two of this company's cards are reproduced on page 47.

In connection with advertising motive power, it is always well to bear one thought in mind. This is, that it is highly necessary for confidence to be established in the minds of the shipping public. This is possible through telling them about the service and then, in turn, about the facilities that make this service possible, showing them that the company has the proper rolling stock to insure prompt and reliable transit.

Blotters are also an effective means of advertising freight service. The company publication, which is generally placed in the car rack, is an excellent medium to keep this service constantly in the minds of the public.

Another effective medium is bill-board advertising. A few bill-boards placed at strategic points along the line may be of considerable service, as generally an attractively painted billboard is hard for a passerby—be he riding or walking—to get away from. A number of electric lines have resorted to this type of advertising for passenger service. Why not consider using such for freight service, which is much more profitable?

The Union Traction Company of Indiana, through a monthly publication known as the *Union Indiana Traction System Magazine*, distributes articles on truck farming and other subjects of interest to its communities. This magazine has proved to be of considerable force in fostering friendly feeling.

THIS IS THE SITUATION

In conclusion, the outstanding points of the electric railway freight situation are these:

1. Electric railway freight haulage is economically one of the most important factors in many of the rapidly growing communities of the country, especially in the Middle West. The field for hauling electric railway freight has not been thoroughly developed, because operators of electric railway properties have not gone into this phase of railroading in an analytical way.

2. A study of operating statistics will show that electric railways have handled freight as a side issue. Very few electric railway properties throughout the country show a freight business of more than 15 per cent of their gross revenue and many not 5 per cent. In the case of steam railroads the freight business has always been the backbone of gross receipts.

3. The "jitney" took millions of dollars from the electric railway before it was regulated, and the motor truck will take many more if electric railway managements do not wake up to the fact that they have an economic duty to perform for the communities served. This duty must be fulfilled by developing to the utmost the commercial and social side of the public by giving adequate freight service and last, but not least, first-class passenger service.

4. To develop freight business properly, it is necessary not only to analyze the field to be served, but also to employ proper facilities in the way of: A well-organized traffic bureau; station facilities according to the character of business to be handled; proper motive-power and rolling-stock equipment; a large number of trailer freight cars and last an unlimited and unrestricted imagination.

Denver Union Station Loop Improvements

Since the article on the layout of the Union Station loop in Denver, published in the issue of the ELECTRIC RAILWAY JOURNAL for Dec. 28, 1918, was prepared, information regarding several improvements at this point has been received. It has been agreed by the city and the Union Station interests, on the one hand, and the Denver Tramway on the other, that a covered runway will be built from the viaduct stairs to the point where the route to car is shown in the panoramic picture on page 1032 of that issue. A telephone booth, an inspector's station and a sand box will be placed at this point, and a large concrete platform will be put in. This will be another stopping point for cars going around the loop, as well as a transfer point to and from all north-side, east-side, and south-side lines that come together at the viaduct.

New Electric Rolling Stock for 1918

The Number of New Cars Ordered, Together with Those Built in Shops of Various Railways, Is Approximately the Same as in 1917, but the Number of Companies Ordering Cars Decreased Considerably—The Increasing Demand for One-Man Cars Is Shown by the Large Number of This type Ordered as Compared with Previous Years

IN THE TABLES given herewith is this journal's annual compilation of the statistics for new rolling stock ordered by electric railways or built in their shops during the past year. While the total number of new cars placed in service is less than for any previous year recorded, the closeness of the 1918 total to the number for the year 1917 is especially encouraging, and comes somewhat as a surprise as it was the general opinion of most officials that very few cars had been ordered during 1918.

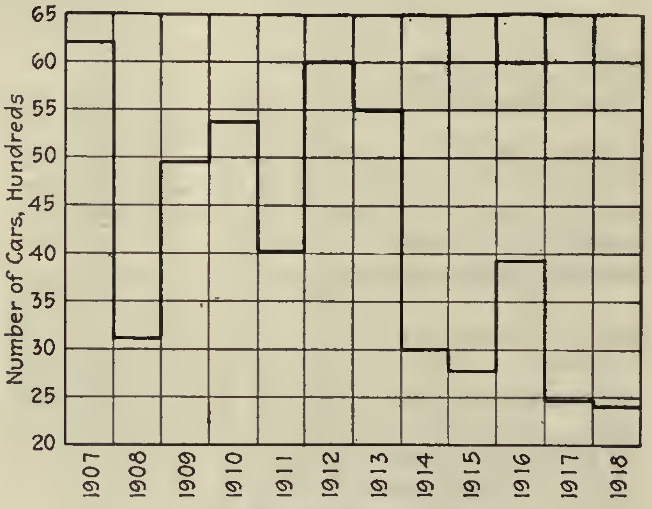
This compilation of figures received from the various electric railways in the United States and Canada represents the railways having about 97 per cent of all the electric cars operated. The total number of new cars so reported for this year is 2419 and is but thirty-six cars less than the number so reported for the year 1917. The number of companies which reported new equipment is 140 as compared with 182 for the year 1917.

Table I gives a comparison in condensed form of rolling stock purchased since 1907. The cars are classified according to the service in which they are used as city, interurban and miscellaneous. In this summary cars for operation on subway and elevated lines have been classed as in city service, and those for interurban or a combination of both interurban and city service have been placed in the interurban column. Electric locomotives, freight and express cars, snowplows and sweepers, and work cars for line and track, have been placed in the miscellaneous column. The numbers of interurban and miscellaneous cars purchased during 1918 has increased slightly over the figures given for the year 1917, and the number of city cars has decreased slightly.

Some of the special features that have been brought out by the canvass are given in Table II, and for comparison the results for 1916 and 1917 have been included. The most notable of these is the increase in the number of one-man cars purchased. There were 644 purchased during the past year as compared with 187 and 280 for 1916 and 1917 respectively. Cars of all kinds built in railway shops total but eighty-nine, which is a large decrease over previous years. The number of interurban trailers increased from twenty-seven for 1917 to fifty-five for the past year. Trailers which may be considered for city service numbered but 130. This included fifty for train operation on the Boston Elevated System. The difference from former years is affected by previous orders for subway trailers purchased by the Interborough Rapid Transit Company, this latter company having purchased no cars during 1918. The number of locomotives ordered was forty-four, which is a decrease of five from the previous year.

TABLE I—NEW ROLLING STOCK ORDERED SINCE 1907

Year	City Cars	Interurban Cars	Freight and Miscellaneous Cars	Total
1907	3,483	1,327	1,406	6,216
1908	2,208	727	176	3,111
1909	2,537	1,245	1,175	4,957
1910	3,571	990	820	5,381
1911	2,884	626	605	4,015
1912	4,531	783	687	6,001
1913	3,820	547	1,147	5,514
1914	2,147	384	479	3,010
1915	2,072	336	374	2,782
1916	3,046	374	522	3,942
1917	1,998	185	272	2,455
1918	1,842	255	322	2,419



CARS ORDERED PER YEAR SINCE 1907

The largest orders of passenger cars for an individual company reported were for 280 cars for use on the lines of the Philadelphia Rapid Transit Company, part of which were ordered by the United States Emergency Fleet Corporation for service to shipyards and part by the United States Housing Corporation, particularly for service to the League Island Navy Yard and the Frankford Arsenal, and an order for 200 motor cars and fifty trailers placed by the Boston Elevated Railroad. The United States Housing Corporation reported a total of 280 passenger cars which it had ordered for various railway properties. In the accompanying list the various railways reporting new equipment have been arranged alphabetically. Space limitations have

TABLE II—SPECIAL COMPARISONS OF NEW ROLLING STOCK

	1918	1917	1916
Number of railways reporting new equipment	140	182	250
Total number of cars ordered	2,419	2,455	3,942
Number of one-man cars ordered	644	280	187
Number of two-men and trail cars ordered for city service	*1,198	1,718	2,859
Number of locomotives purchased	44	49	31
Number of cars built in railway companies' shops	89	281	445
Number of interurban trailers purchased	55	27	71
Number of city trailers purchased	130	402	128

* Includes 100 motor cars for subway and elevated use.

made it necesssary to condense the data as much as possible. All cars are specified as either passenger or miscellaneous, and locomotives are entered separately. The classification of cars for city or interurban service has been made here in the same manner as previously explained. No attempt has been made to give details of construction other than over-all length. The majority of passenger cars are of either semi-steel or all-steel construction.

Although reports from all companies were not received in time for compilation and while studies of this magnitude which must close on a definite date which necessarily precludes the possibility of a 100 per cent report from the industry, still the figures present very complete and accurate data. Through the courtesy and co-operation of the various car builders, equipment manufacturers and government organizations which have been interested in electric railways as a war measure, complete lists have been obtained so that it has been possible to check the companies' figures from several different sources. This courtesy and co-operation in supplying statistics is fully appreciated.

New Electric Rolling Stock Ordered in 1918

Railway	Number	Type	Overall Length	City or Interurban	Motor or Trailer	One or Two Man
Allis-Chalmers Co.	1	Sn.Pl.	28' 0"	......	Mot.	.....
Auburn & Syracuse Elec. R.R.	1	Loco.	....	50 ton	.....	.....
Augusta, Aiken Ry. & Elec. Corp.	14	Psgr.	....	City	Mot.	Two
Bamberger Electric R.R.	3	Psgr.	63' 0"	Int.	Mot.	Two
	1	Psgr.	56' 0"	Int.	Mot.	Two
	3	Psgr.	63' 0"	Int.	Trail	.....
Bangor Ry. & Elec. Co.	23	Psgr.	27' 9½"	City	Mot.	One
Boston Elevated Ry.	200	Psgr.	48' 9½"	City	Mot.	Two
	50	Psgr.	48' 2½"	City	Trail	.....
	6	Swpr.	39' 0"	City	Mot.	.....
Brockton & Plymouth St. Ry.	2	Psgr.	27' 9½"	City	Mot.	One
Brooklyn Rapid Transit Co.	50	Psgr.	45' 6"	City	Trail	.....
Buffalo, Lockport & Rochester Ry	1	Swpr.	28' 0"	Int.	Mot.	.....
Buffalo & Lake Erie Traction Co.	10	Psgr.	50' 0"	Int.	Trail	.....
	12	Psgr.	50' 0"	Int.	Mot.	Two
	3	Exp.	50' 0"	Int.	Mot.	....
Capital Traction Co.	20	Psgr.	43' 11½"	City	Mot.	Two
Charleston Consolidated Ry. & Ltg. Co.	6	Psgr.	41' 0"	City	Mot.	Two
	10	Psgr.	41' 0"	City	Trail	.....
	10	Psgr.	27' 9½"	City	Mot.	One
Charleston Interurban R.R.	2	Psgr.	47' 3"	Int.	Mot.	Two
	2	Psgr.	40' 6"	Int.	Mot.	Two
	2	Psgr.	40' 6"	Int.	Trail	....
Chester & Eddystone St. Ry.	22	Psgr.	45' 4"	Int.	Mot.	Two
Chicago, Lake Shore & South Bend Ry	1	Psgr.	43' 0"	Int.	Mot.	Two
Chicago, Milwaukee & St. Paul Ry	5	Loco.	76' 0"	Int.	Mot.	.....
	2	Loco.	41' 6"	Int.	Mot.	.....
	10	Loco.	90' 6"	Int.	Mot.	.....
Chicago, North Shore & Milwaukee R.R.	1	Loco.	37' 4"	50 ton	Mot.	.....
Chicago & West. Towns Ry.	2	Psgr.	40' 0"	City	Mot.	Two
Cincinnati & Columbus Traction Co	1	Frt.	50' 0"	Int.	Mot.	.....
Cleveland, Alliance & Mahoning Valley R.R	1	Psgr.	55' 0"	Int.	Mot.	Two
Colorado Springs & Int. Ry	24	Psgr.	27' 9½"	City	Mot.	One
Columbia Ry. Gas & Elec. Co.	3	Psgr.	50' 0"	City	Mot.	Two
	8	Psgr.	45' 0"	City	Mot.	Two
Columbus R.R. of Georgia	8	Psgr.	27' 9½"	City	Mot.	One
Columbus Ry. Pr. & Lt. Co	9	Psgr.	48' 0½"	City	Mot.	Two
Concord, Maynard & Hudson St. Ry	4	Psgr.	43' 0"	Int.	Mot.	Two
	1	Psgr.	27' 9½"	City	Mot.	One
Connecticut Co	20	Psgr.	27' 9½"	City	Mot.	One
	50	Psgr.	43' 10"	City	Mot.	Two
	4	Misc.	38' 0"	City	Trail	.....
	1	Misc.	45' 0"	City	Mot.	.....
Cumberland County Pwr. & Lt. Co	8	Psgr.	44' 0"	City & Int.	Trail	.....
Denver Tramway	1	Sand	33' 2½"	.....	Mot.	.....
Detroit United Ry	1	Psgr.	46' 10"	City	Mot.	Two
	2	Sn.Pl.	23' 2"	City	Mot.	.....
Douglas Traction & Lt. Co	1	Psgr.	27' 9½"	City	Mot.	One
Eastern Texas Elec. Co	5	Psgr.	27' 9½"	City	Mot.	One
East St. Louis Ry	2	Psgr.	27' 9½"	City	Mot.	One
Easton Transit Co	1	Sn.Pl.	40' 0"	Int.	Mot.	...
El Paso Elec. Ry	20	Psgr.	27' 9½"	City	Mot.	One
Empire State R. R. Corp	1	Sn.Pl.	....	Int.	Mot.	....
Fort Dodge, Des Moines & Southern R.R	1	Psgr.	29' 3½"	City	Mot.	One
	1	Psgr.	45' 0"	Int.	Mot.	Two
Fort Wayne & N. Indiana Traction Co.	25	Psgr.	30' 7"	City	Mot.	One
	1	Sn.Pl.	22' 0"	City	Mot.	...
Galveston Elec. Co	5	Psgr.	27' 9½"	City	Mot.	One
Gary Street Ry	10	Psgr.	48' 0"	Int.	Mot.	Two
	4	Psgr.	50' 0"	Int.	Trail	....
	10	Psgr.	27' 9½"	City	Mot.	One
Gary & Valparaiso Ry	2	Psgr.	34' 7½"	Int.	Mot.	Two
Glendale & Montrose Ry.	3	Psgr.	27' 9½"	City	Mot.	One
Grafton & Upton R.R.	2	Loco.	26' 0"	....	..	..
Grays Harbor Ry. & Lt. Co	6	Psgr.	27' 9½"	City	Mot.	One
Hammond, Whiting & East Chicago Ry	10	Psgr.	48' 0"	City	Mot.	Two
Harrisburg Rys	5	Psgr.	43' 10"	Int.	Mot.	Two
Hot Springs Street Ry.	7	Psgr.	27' 9½"	City	Mot.	One
Houston Elec. Co	8	Psgr.	27' 9½"	City	Mot.	One
Hull Electric Co	1	Swpr.	46' 0"	...	Mot	...
Hydro-Elec. Power Commission	12	Locos.	36' 0"	50 tons	.....	.....
	1	Sn.Pl.		......	.....	.....
	2	Work Cars......		.....	.....	.....
	200	Dump Cars—20 cu.yd....			.....	.....
Illinois Traction System	6	Loco.	32' 0"	Int.	Mot.	.....
Indianapolis & Louisville Traction Ry.	1	Misc.	72' 0"	Int.	Trail	.....
Inland Steel Co.	1	Swpr.	28' 0"	City	Mot.	....
International Ry.	30	Psgr.	50' 0"	Int.	Mot.	Two
Inter-Urban Ry.	1	Loco.	60 ton	Int.	...	....
Iowa Ry. & Lt. Co.	1	Psgr.	58' 0"	Int.	Mot.	Two
Kansas City Rys.	25	Psgr.	27' 9½"	City	Mot.	One
Laconia Street Ry.	2	Psgr.	27' 9½"	City	Mot.	One
Lehigh Valley Transit Co.	15	Psgr.	47' 0"	City	Mot.	Two
	2	Sn.Pl.	40' 0"	Int.	Mot.	.....
Lewisburg, Milton & Watsontown Psgr. Ry.	3	Psgr.	32' 4"	City & Int.	Mot.	Two
Lewiston, Augusta & Waterville St. Ry.	6	Psgr.	45' 6"	Int.	Mot.	Two
	1	Sn.Pl.	41' 4"	Int.	Mot.	....
Louisville & S. Indiana Trac. Co.	10	Psgr.	27' 9½"	City	Mot.	One
	1	Swpr.	28' 0"	City	Mot.	....
Madison Rys	5	Psgr.	....	City	Mot.	Two
Mahoning & Shenango Ry. & Lt. Co.	1	Psgr.	45' 0"	City	Mot.	Two
Manhattan Bridge 3-cent Line	2	Psgr.	42' 0"	City	Mot.	Two
Manila Elec. R.R. & Light Corp.	15	Psgr.	39' 4"	City	Mot.	Two
Mansfield Public Service & Utility Co.	7	Psgr.	27' 9½"	City	Mot.	One
	1	Swpr.	....	City	Mot.	...
Middlesex & Boston St. Ry.	6	Psgr.	27' 9½"	City	Mot.	One
Mobile Lt. & R.R.	3	Psgr.	47' 5"	Int.	Mot.	Two
	6	Psgr.	45' 0"	Int.	Trail	.....
	3	Psgr.	45' 0"	Int.	Mot.	Two
Monongahela Valley Trac. Co.	6	Psgr.	40' 6"	City	Mot.	Two
	4	Psgr.	48' 0"	Int.	Mot.	Two
	2	Exp.	45' 0"	Int.	Mot.	.....
	1	Loco.	45 ton	Int.	Mot.	.....
Newport News & Hampton Ry., Gas & Elec. Co.	28	Psgr.	46' 0"	City	Mot.	Two
Newport & Providence Ry.	1	Psgr.	27' 9½"	City	Mot.	One
New York Municipal Ry.	100	Subw'y	67' 0"	City	Mot.	Train Opr.
Nipissing Central Ry.	2	Psgr.	52' 0"	Int.	Mot.	Two
	1	Sn.Pl.	40' 0"	Int.	Mot.	.....
North Coast Pr. Co.	3	Psgr.	27' 9½"	City	Mot.	One
Northern Elec. Ry.	1	Loco.	37' 4"	60 ton	Mot.	....
Northern Texas Trac. Co.	10	Psgr.	27' 9½"	City	Mot.	One
Oklahoma Ry.	10	Psgr.	32' 0"	City	Mot.	Two
	1	Loco.	36' 0"	40 tons	.....	.....
Oklahoma Union Ry.	2	Psgr.	48' 0"	Int.	Mot.	Two
Pacific Electric Ry.	35	Psgr.	27' 9½"	City	Mot.	One
Pan Handle Trac. Co.	9	Psgr.	57' 10"	Int.	Mot.	Two
Peekskill Lighting & R.R. Co.	4	Psgr.	27' 9½"	City	Mot.	One
Peninsular Ry.	5	Psgr.	27' 9½"	City	Mot.	One
Petersburg-Hopewell & City Point Ry.	8	Psgr.	47' 0"	Int.	Mot.	Two
Philadelphia Rapid Transit Co.	240	Psgr.	45' 6"	City	Mot.	Two
	15	Psgr.	47' 8"	City	Mot.	Two
	25	Psgr.	27' 9½"	City	Mot.	One
Philadelphia Rys	15	Psgr	47' 8"	City	Mot.	Two
Philadelphia & West Chester Trac. Co	1	Frt.	50' 0"	City	Mot.	
Pittsburg County Ry	6	Psgr.	27' 9½"	City	Mot.	One
Pittsburg, Mars & Butler Ry	2	Psgr.	27' 9½"	City	Mot.	One
Pittsburg Rys.	6	Swpr.	28' 0"	City	Mot.	...
Port Arthur Trac. Co.	4	Psgr.	27' 9½"	City	Mot.	One
Portland Ry. Lt. & Pr. Co.	25	Psgr.	27' 9½"	City	Mot.	One
Public Service Ry. (N. J.)	25	Psgr.	50' 10"	City	Mot.	Two
	33	Psgr.	48' 4½"	City	Mot.	Two
Puget Sound Trac., Lt. & Pr. Co.	15	Psgr.	27' 9½"	City	Mot.	One
Reading Transit & Lt. Co.	2	Psgr.	30' 0"	City	Mot.	Two
	1	Line	37' 0"	City	Mot.	...
	1	Work	45' 0"	City	Mot.	...
	1	Swpr.	28' 0"	City	Mot.	....
Richmond Lt. & R.R	24	Psgr.	36' 6"	City	Mot.	Two
Rochester, Syracuse R.R., Inc.	1	Swpr.	....	Int.	Mot.	
Sacramento, Northern R.R.	1	Loco.	....	50 ton	....	....
San Francisco-Oakland Terminal Rys	10	Psgr.	....	City	Trail	.....

Railway	Number	Type	Overall Length	City or Interurban	Motor or Trailer	One or Two Man
Saginaw Bay City Ry	7	Psgr.	42′ 0″	City	Mot.	Two
	14	Psgr.	27′ 9½″	City	Mot.	One
	1	Swpr.	40′ 0″	City	Mot.	Two
	1	Sn.Pl.	45′ 6″	City & Int.	Mot.	Two
	1	Line car	30′ 0″	City	Mot.	Two
Sand Springs Ry	2	Psgr.	60′ 0″	Int.	Mot.	Two
Scioto Valley Trac. Co	4	Psgr.	60′ 0″	Int.	Mot.	Two
	1	Frt.	50′ 0″	Int.	Mot.	.....
	6	Frt.	42′ 0″	Int.	Trail	.....
Seattle Municipal Ry	12	Psgr.	27′ 9½″	City	Mot.	One
	25	Psgr.	43′ 2½″	City	Mot.	Two
Sheffield Co	9	Psgr.	44′ 0″	City	Trail	.....
Shore Line Elec. Ry	2	Psgr.	45′ 8½″	Int.	Mot.	Two
Southern New York Pr. & Ry. Corp	4	Box for mail service......			.....	.....
Southern Public Utilities Co	4	Psgr.	38′ 2″	City	Mot.	Two
Southwest Missouri R.R	7	Psgr.	44′ 0″	Int.	Mot.	Two
Springfield Trac. Co	12	Psgr.	27′ 9½″	City	Mot.	One
Stark Elec. R.R	2	Psgr.	55′ 0″	Int.	Mot.	Two
St. Cloud Public Service Co	4	Psgr.	34′ 0″	City	Mot.	One
Steubenville, East Liverpool & Beaver Valley Tr. Co	1	Swpr.	28′ 0″	City	Mot.	.....
St. Joseph Ry. Lt., Ht. & Pr. Co.	12	Psgr.	27′ 9½″	City	Mot.	One
Stockton Electric R.R	5	Psgr.	27′ 9½″	City	Mot.	One
Tacoma Municipal Ry	20	Psgr.	43′ 0″	City	Mot.	Two
Tacoma Ry. & Pr. Co	29	Psgr.	27′ 9½″	City	Mot.	One
Tampa Elec. Co	24	Psgr.	27′ 9½″	City	Mot.	One
Terre Haute, Indianapolis & Eastern Trac. Co	5	Frt.	40′ 0″	Int.	Trail	.....
Terre Haute Trac. & Lt. Co	30	Psgr.	27′ 9½″	City	Mot.	One
Texas Elec. Ry	6	Psgr.	27′ 9½″	City	Mot.	One
Tontrup, Geo. H. (St. Louis)*	50	Psgr.	27′ 9½″	City	Mot.	One
Trenton & Mercer County Trac. Corp	20	Psgr.	27′ 9½″	City	Mot.	One
	1	Psgr.	43′ 5″	City	Mot.	Two
Tuscaloosa Ry. & Utilities Co	1	Psgr.	49′ 0″	City	Trail	.....
Union Ry	1	Sn.Pl.	....	....	.....	.....
Union Street Ry	6	Psgr.	44′ 0″	City	Mot.	Two
United Rys. & Elec. Co	50	Psgr.	44′ 8″	City	Mot.	Two
Utah-Idaho Central R.R	5	Psgr.	27′ 9½″	City	Mot.	One
Vicksburg Lt. & Trac. Co	4	Psgr.	27′ 9½″	City	Mot.	One
Virginia Ry. & Pr. Co	50	Psgr.	27′ 9½″	City	Mot.	One
Washington, Baltimore & Annapolis E. R.R	5	Psgr.	57′ 0″	Int.	Mot.	Two
Washington Ry. & Elec. Co	50	Psgr.	43′ 11½″	Int.	Mot.	Two
Washington-Virginia Ry	22	Psgr.	48′ 0″	Int.	Mot.	Two
	20	Psgr.	48′ 0″	Int.	Trail	.....
	5	Psgr.	45′ 0″	Int.	Mot.	Two
Waterville, Fairfield & Oakland Ry	2	Psgr.	43′ 6″	City	Mot.	Two
Webster, Monessen, Belle Vernon & Fayette City St. Ry	3	Psgr.	32′ 0″	City	Mot.	Two
Western New York & Penn. Trac. Co	2	Psgr.	47′ 0″	Int.	Mot.	Two
West Penn. Rys	4	Psgr.	57′ 10″	Int.	Mot.	Two
	4	Swpr.	28′ 0″	Int.	Mot.	.....
Western Washington Pr. Co	10	Psgr.	48′ 0″	Int.	Mot.	Two
Wheeling Trac. Co	29	Psgr.	50′ 0″	City	Mot.	Two
Winnipeg Elec. Ry	10	Psgr.	45′ 8½″	City	Mot.	Two
	1	Swpr.	37′ 8″	City	Mot.	.....

* Included to have table represent all known orders.

An Engineering Magazine to Be Published in Spanish

REALIZING the value of the international exchange of ideas on things engineering, the McGraw-Hill Company on March 1 will begin publication of a magazine dedicated to that purpose. While eventually it is expected to appear in editions in several languages, the original issue will be in Spanish, under the name *La Ingenieria Internacional*, aimed to serve Latin-America and Spain.

The purpose of the new magazine, which has been under consideration for some years, is to afford a medium for presentation of those developments in American engineering which may be of value to engineers, contractors and manufacturers in other lands. At the same time, following the practice of the present McGraw-Hill publications, a far-flung editorial organization will be developed, so that there will be drawn into the paper the best of engineering practice in Latin America, Spain and other Spanish-speaking countries. Aside from this function, the new magazine will be an important developer of international good-will, and at the same time a medium by which American manufacturers engaging in export trades can carry their message to prospective buyers in foreign lands.

It may be a cause for surprise that the McGraw-Hill Company, whose specialized papers circulate so widely overseas, should establish a magazine to serve the foreign field. The reason, however, is not hard to find. The present highly-specialized papers appeal primarily to those who are situated where engineering enterprise has made such progress that there is room for the specialist and need for the last refinement in equipment and design.

But everywhere the world over are territories newly developing, where the engineer, the contractor and the manufacturer must undertake not one but many lines. It is to serve the general practitioner so situated that the new magazine, and its later companions in other languages, will be started. The specialized papers in English will still hold their place as the recorders of the best in the advanced practice of engineering in America and abroad.

1917 Census of Street and Electric Railways Due Soon

S. L. ROGERS, Director of the Census, in his annual report to the Secretary of Commerce, made public in Washington the past week, announces that his bureau will soon be able to present to the public the result of the census of electrical industries which was taken during 1917. The census, which was begun in April, will present information as to the number of establishments engaged in electrical industry, character of ownership, traffic, equipment, expenses, employees, salaries and wages, finances, etc. The compilation of this information is now under way. An abstract of the 1912 census report was printed in the issues of the ELECTRIC RAILWAY JOURNAL for Jan. 9 and 16, 1915, pages 96 and 130.

In his annual report Director Rogers says:

> This census, which, under the act creating the permanent Census Bureau, has been taken quinquennially since 1902, covers central electric light and power stations, street and electric railways, telephones and telegraphs, and municipal electric fire alarm and police patrol signaling systems. The current inquiry is being made as of Dec. 31, 1917.
>
> By reference to the various records available, supplemented by correspondence with some 14,000 postmasters throughout the country, with state telephone associations, and with public service commissions, a card index of establishments engaged in electrical industries was prepared. In formulating the schedules used, criticisms and suggestions were requested and obtained from the Interstate Commerce Commission, the American Telephone & Telegraph Company, the independent telephone companies, the American Electric Railway Association, the American Railway Accountants' Association, and the National Electric Light Association, and a number of conferences were held with representatives of these organizations. All the organizations named have given their hearty co-operation and have rendered valuable assistance to the bureau in the revision of the schedules and the preparation of the reports.

New Track Constructed and Track Rebuilt During 1918

Reports Received from the Various Electric Railways in the United States and Canada Show a New Electric Mileage of 346 Constructed During the Past Year and 275 Miles of Steam Lines Electrified—The Amount of Track Reconstruction Was Very Small

THE single track mileage for new lines built or electrified during the year 1918 together with the mileage of track rebuilt by electric railways in the United States and Canada is given in the accompanying tabulation. The data for this record have been received from electric railways comprising about 97 per cent of the total mileage under electric operation and are quite complete in view of the difficulties involved in conducting a canvass of such large proportions.

In order to facilitate comparison with similar data for previous years the following table has been prepared from the statistical tables published by the ELECTRIC RAILWAY JOURNAL for the years since 1907. In this the amount of electrified steam mileage has been separated from the new electric mileage.

The total new electric railway track mileage exclusive of the electrified steam lines for the year amounting to 314 is but 63 miles less than that reported during 1917. When the difficulties that most roads have experienced in obtaining new rails and special work is considered this record is very gratifying. However most of this is made of spurs and short extensions and few additions of any considerable extent were carried out due to the extreme conditions. Of the 314 miles of new electric railway track built, 80.85 miles was for the various additions to new rapid transit lines in New York City. In addition to this there was 135.56 miles of new track built for city service and 97.4 miles constructed for interurban operation. Although a comparison of the new electrified mileage placed in operation in the last two years shows a decrease from the figures of 1916 still the year 1918 more nearly approached these figures. Both the 1916 and the 1918 electrified mileages were augmented by the extensions of the Chicago, Milwaukee & St. Paul electrification which amounted to 225 miles in 1916 and 211 miles in 1918. Outside of this the greatest amount of electrified mileage reported for this year was 51.15 miles of main and branch line track together with sidings and yards electrified by the Norfolk & Western Railway.

In the general compilation of the statistics received the usual plan of grouping the roads by states has been followed. New York heads the list of states with a total of 87.93 miles of new track and 25.59 miles of track rebuilt. This, of course, excludes the states of Montana and West Virginia, in which large amounts of steamroad electrification were included. Following this comes California with 28.94 miles and Washington with 24.65 miles of new track constructed, the greater part of which was for city service.

COMPARISON OF NEW TRACK BUILT—BY YEARS

Year	New Electric Railway Track Built	Electrified Steam Line	Total New Electric Mileage
1907	......	....	1,880.0
1908	1,174.5	84.0	1,258.5
1909	774.7	112.4	887.1
1910	1,204.8	192.4	1,397.2
1911	1,105.0	86.5	1,191.5
1912	869.4	80.8	950.2
1913	974.9	119.0	1,093.9
1914	716.5	229.0	946.4
1915	596.0	448.2	1,044.2
1916	356.3	388.0	744.3
1917	376.7	66.0	442.7
1918	313 82	275.7	589.53

In Canada the Niagara Construction Railway built 28 miles of interurban track between Stamford, St. David's and Queenstown, Ontario. This was the greatest amount reported.

The total rebuilt mileage for the year was 155.43 as compared with 375.4 miles for the year 1917 or less than half as much. Most of this was in short stretches, there being but seven companies which rebuilt more than 5 miles and the largest amount reported was but 9 miles.

ALABAMA	New Track, Miles	Rebuilt Mileage
Mobile & Pensacola Ry. & Navigation Co.	0.00	2.00
Peoples Railroad	1.50	0.00
	1.50	2.00
ARKANSAS		
Intercity Terminal Ry.	0.00	1.10
	0.00	1.10
CALIFORNIA		
Municipal Railway of San Francisco	9.72	0.00
Pacific Electric Railway	15.04	0.00
Pacific Gas & Electric Co.	0.04	0.00
Petaluma & Santa Rosa Ry.	0.16	0.00
San Diego Electric Ry.	1.31	2.00
United Railroads of San Francisco	2.67	2.50
	28.94	4.50
COLORADO		
Arkansas Valley Ry., Lt. & Pr. Co.	0.00	2.25
Denver Tramway	0.24	0.63
	0.24	2.88

CONNECTICUT	New Track, Miles	Rebuilt Mileage
Connecticut Co.	1.57	1.15
The Shore Line Electric Ry.	0.00	1.10
	1.57	2.25
DISTRICT OF COLUMBIA		
Capital Traction Co.	1.02	0.59
Washington & Maryland Ry.	0.93	0.00
	1.95	0.59
FLORIDA		
Jacksonville Traction Co.	6.41	0.00
	6.41	0.00
GEORGIA		
Columbus R. R.	0.50	0.00
Savannah Electric Co.	4.98	0.00
	5.48	0.00
IDAHO		
Caldwell Traction Co.	12.00	0.00
	12.00	0.00

	New Track, Miles	Rebuilt Mileage
ILLINOIS		
Chicago Surface Lines	7.00	8.50
Chicago & Interurban Traction Co	0.00	0.30
Chicago & Oak Park Elevated R. R.	0.00	2.37
Chicago, North Shore & Milwaukee R. R.	2.30	0.00
Evanston Ry.	0.00	1.00
Hammond, Whiting & East Chicago Ry.	0.85	0.23
Metropolitan West Side Elevated Ry	0.00	0.34
Northwestern Elevated R. R.	0.00	1.52
	10.15	14.26
INDIANA		
Chicago, South Bend & Northern Indiana Ry.	5.00	0.00
Fort Wayne & Northern Indiana Traction Co.	0.79	1.30
Terre Haute, Indianapolis & Eastern Traction Co.	0.00	0.50
Union Traction Co. of Indiana	0.00	0.77
Vincennes Traction Co.	0.60	0.40
	6.39	2.97
IOWA		
Moline, Rock Island & Eastern Traction Co.	0.70	0.00
Ottumwa Ry. & Light Co.	0.00	0.27
Tri-City Ry.	1.72	0.82
	2.42	1.09
KANSAS		
Kansas City, Lawrence & Topeka R. R.	0.00	0.06
Manhattan City & Interurban Ry.	0.10	0.00
	0.10	0.06
LOUISIANA		
New Orleans Ry. & Lt. Co.	1.67	1.07
	1.67	1.07
MAINE		
Bangor Ry. & Electric Co.	0.00	0.27
Lewiston, Augusta & Waterville Street Ry.	1.84	0.44
Portland R. R.	0.29	0.62
Waterville, Fairfield & Oakland Ry.	0.00	0.25
	2.13	1.58
MARYLAND		
United Rys. & Electric Co.	4.75	9.15
	4.75	9.15
MASSACHUSETTS		
Blue Hill Street Ry.	0.00	1.50
Boston Elevated Ry.	3.64	9.00
Holyoke Street Ry.	0.00	1.00
Middlesex & Boston Street Ry.	0.00	0.35
Springfield Street Ry.	0.00	1.00
Union Street Ry.	0.11	1.56
Worcester Consolidated Street Ry.	0.98	1.50
	4.73	15.91
MICHIGAN		
Detroit, Jackson & Chicago Ry.	0.00	0.12
Detroit United Ry.	11.18	1.88
Escanaba Traction Co.	0.00	0.80
	11.18	2.80
MISSOURI		
Kansas City Rys.	1.61	4.42
Missouri Electric R. R.	0.21	0.00
Southwest Missouri R. R.	15.00	0.00
St. Louis & Jennings Ry.	0.00	1.25
United Rys. Co. of St. Louis	4.01	10.41
Vicksburg Lt. & Traction Co.	0.00	5.00
	20.83	21.08
MONTANA		
Anaconda Copper Mining Co.	1.0	0.00
Chicago, Milwaukee & St. Paul Ry.	211.0	0.00
	212.0	0.00
NEBRASKA		
Omaha & Council Bluffs Street Ry.	0.00	1.00
	0.00	1.00
NEW JERSEY		
Millville Traction Co.	0.00	0.50
Public Service Ry.	3.04	0.00
	3.04	0.50
NEW MEXICO		
Las Vegas Transit Co.	0.00	1.06
	0.00	1.06
NEW YORK		
Auburn & Syracuse Electric R. R.	0.23	0.00
Brooklyn Rapid Transit System (Surface)	0.00	6.90
Buffalo & Depew Ry.	0.50	3.00
Buffalo & Lake Erie Traction Co.	3.80	0.76
Bush Terminal R. R.	0.06	0.00
Hornell Traction Co.	0.00	0.10
Interborough Rapid Transit Co.	55.60	0.00
International Ry.	0.00	1.36
New York Central R. R.	1.56	0.00
New York Municipal Ry. Corp.	25.25	0.00
New York Rys.	0.00	1.04
New York State Rys. (Syracuse-Utica Line)	0.09	1.93
Niagara Junction Ry.	0.58	0.00
Southern New York Pwr. & Ry. Corp.	0.00	3.00
Third Ave. Ry.	0.26	7.50
	87.93	25.59
NORTH CAROLINA		
Durham Traction Co.	0.00	0.75
Tidewater Pwr. Co.	4.00	0.00
	4.00	0.75
NORTH DAKOTA		
Northern States Power Co.	0.00	0.33
	0.00	0.33
OHIO		
City Ry., Dayton	0.00	0.87
Columbus, Delaware & Marion Electric Co.	0.00	1.50
Mahoning & Shenango Ry. & Lt. Co.	4.90	0.00
Northern Ohio Traction & Lt. Co.	2.96	0.04
The Oakwood Street Ry.	0.57	0.00
Ohio River Electric Ry. & Pwr. Co.	0.00	1.00
Richland Public Service Co.	0.00	0.17
Springfield Terminal Ry. & Pwr. Co.	0.10	0.00
	8.53	3.58
OKLAHOMA		
Enid City Ry.	0.00	0.30
Oklahoma Union Ry.	10.00	0.00
Sand Springs Ry.	3.00	3.00
	13.00	3.30
OREGON		
Pacific Pwr. & Lt. Co.	0.05	0.00
Portland Ry., Lt. & Pwr. Co.	0.16	0.54
	0.21	0.54
PENNSYLVANIA		
Conestoga Traction Co.	0.23	0.00
Harrisburg Rys.	0.00	0.45
Lewisburg, Milton & Watsontown Psgr. Ry.	0.31	0.00
Penn Central Ry.	3.50	0.00
Philadelphia Rys.	4.75	8.00
Pottstown & Phoenixville Ry.	0.00	3.00
Reading Transit & Lt. Co.	0.00	2.25
Woodlawn & Southern Street Ry.	0.18	0.00
	8.97	13.70
RHODE ISLAND		
The Rhode Island Co.	0.00	3.10
	0.00	3.10
SOUTH DAKOTA		
Sioux Falls Traction System	0.00	0.70
	0.00	0.70
TEXAS		
Dallas Ry.	3.43	2.71
Eastern Texas Electric Co.	0.00	0.10
El Paso Electric Ry.	0.00	0.75
	3.43	3.56
VIRGINIA		
Newport News & Hampton Ry., Gas & Elec. Co.	4.04	0.20
	4.04	0.20
WASHINGTON		
Seattle Municipal Street Ry.	23.00	0.00
Tacoma Municipal Ry.	1.65	0.00
	24.65	0.00
WEST VIRGINIA		
Charleston Interurban R. R.	1.90	6.30
Lewisburg & Ronceverte Electric Ry.	0.70	0.00
Monongahela Valley Traction Co.	4.00	0.18
Norfolk & Western Ry.	51.15	0.00
	57.75	6.48
WISCONSIN		
Madison Rys.	0.21	0.00
Wisconsin Ry., Lt. & Pwr. Co.	0.00	1.00
	0.21	1.00
MANITOBA		
Suburban Rapid Transit Co.	0.25	0.00
Winnipeg Electric Ry.	1.76	0.00
	2.01	0.00
ONTARIO		
Grand River Ry.	2.00	0.00
Guelph Radial Ry.	0.00	0.50
Niagara Construction Ry.	28.00	0.00
Port Arthur Civic Ry.	0.00	0.92
Sandwich, Windsor & Amherstburg Ry.	3.00	0.00
Toronto Civic Ry.	1.99	0.00
	34.99	1.42
QUEBEC		
Hull Electric Ry.	1.33	1.33
Levis County Ry.	0.00	4.00
Shawinigan Falls Terminal Ry.	1.00	0.00
	2.33	5.33
Total for all companies	589.53	155.43

Data on Automatic Substations

THE automatic control of substation equipment, and to a less extent that of power plant equipment, is a development of but a few years. So far but one manufacturer has gone into this field extensively, but one other has already entered it and others may be expected to do so in time. War conditions have hampered progress but the installations and the apparatus ordered, as listed in the accompanying table, make a creditable showing. Interest in the "automatic" is so great now that the year 1919 should bring a substantial increase in its application.

It has seemed wise to include the automatic control equipment for electric generators in this first table. Another year may make a separate list of this desirable. Included in the table also is an automatic synchronous condenser control used for correcting power factor on the lines of the Interstate Light & Power Company. This is another field automatic control which illustrates the flexibility and adaptability of the fundamental scheme.

The forerunner of the automatic substation, the remote-control substation installed by the Detroit Edison Company in 1913, is not included in the table as being outside of its scope. This substation should not be overlooked, however, as the Detroit Edison is now operating five of these 500-kw. remote-controlled lighting converter substations on its 4600-volt, 60-cycle supply lines. The last one was put into commission in 1918. The pioneer true "automatic" was that started in July, 1915, on the line of the Elgin & Belvidere Electric Company, as shown in the second line of the table.

Details of the novel features of practicably all of this equipment listed in the table have been given in recent issues of the ELECTRIC RAILWAY JOURNAL. In an early issue Charles H. Jones will take up the substation of the Chicago, North Shore & Milwaukee Railroad, and other articles will supplement those already printed.

Coal-Saving Bonus in London

The London County Council is distributing a coal-saving bonus among motormen and conductors on its tramways. During the past quarter the saving was more than $16,000, one-half of which has been distributed. This is slightly under 5 per cent of the value of the total consumption, and it is expected that even better results will be secured as the possibility of saving becomes more clearly understood by the men.

AUTOMATIC SUBSTATIONS INSTALLED BY, OR ON ORDER FROM, THE GENERAL ELECTRIC COMPANY

Company	No. of Stations	No. of Contr. Eqpt.	Kilowatt Rating	Type of Machine	Trolley Voltage	Power Supply Voltage	Frequency, Cycles per Second	Remarks	Placed in Operation
New South Wales Government Railways	1	1	450	Synchronous converter	600	6,600	25	Remote control	February, 1916
Elgin & Belvidere Electric Co.	3	3	300	Synchronous converter	600	26,400	25		July, September October, 1915
Potomac Electric Company	1	1	500	Synchronous converter	600	12,500	25		June, 1916
Milwaukee Electric Railway & Light Company	1	1	2-300	Synchronous converter	1200	13,200	25	Two machins operating in series	May, 1917
Interstate Light & Power Co., Hasel Green, Ill.	1	1	3000	Synchronous converter	600	2,300	60		February, 1917
Des Moines City Railway	1	1	500	Synchronous converter	600	2,250/4,500	25		October, 1916
Des Moines City Railway	1	1	500	Synchronous converter	600	4,500/22,500	25	Portable substation	September, 1916
Inter Urban Railway, Des Moines, Iowa	2	2	300	Synchronous converter	600	22,500	25		December, 1916 February, 1917
Inter Urban Railway, Des Moines, Iowa	1	1	500	Synchronous converter	600	22,500	25		November, 1917
Grand Rapids, Grand Haven & Muskegon Railway	1	1	500	Synchronous converter	600	17,500	30		April, 1917
Adirondack Electric Power Corporation	1	1	300	Synchronous converter	600	17,300	40		
Rhode Island Company	1	2	300	Synchronous converter	600	13,200/11,200	25	Operate in Paralul	May, 1918
Rhode Island Company	1	1	300	Synchronous converter	600	11,000/22,000	60		February, 1918
Chicago & Interurban Traction Company	1	1	500	Synchronous converter	600	33,000	25		August, 1917
Columbus Railway, Power & Light Company	1	1	500	Synchronous converter	600	13,200/22,800	60	Remote control	March, 1918
Boston & Maine Railroad	1	1	112	Water wheel generator	500			Direct feed	July, 1917
Des Moines City Railway	2	2	500	Synchronous converter	600	2,200/4,400	25		November, 1917 January, 1918
Butte Electric Railway	1	1	500	Synchronous converter	600	3,800	60		January, 1918
Aurora, Elgin & Chicago Railroad	1	1	500	Synchronous converter	600	26,400	25		August, 1918
Chicago & Interurban Traction Company	1	1	300	Synchronous converter	600	33,000	25	Portable	
Iowa Railway & Light Company	1	1	500	Synchronous converter	600	16,500/33,000	60		April, 1918
Kansas City Railway	1	1	300	Synchronous converter	600	6,600/13,200	25	Portable	June, 1918
Chicago, North Shore & Milwaukee Railroad	1	1	500	Synchronous converter	600	33,000	25		April, 1918
Des Moines City Railway	2	2	500	Synchronous converter	600	2,250/4,500	25		April, 1918 May, 1918
Chicago, North Shore & Milwaukee Railroad	1	1	500	Synchronous converter	600	33,000	25		December, 1917
New York State Railways	1	1	300	Synchronous converter	600	60,000	40		
Northern Ohio Traction & Light Company	2	2	500	Synchronous converter	600	22,000	60		
Kansas City Railways	1	1	1000	Synchronous converter	600	6,600	25		
Transit Supply Company	1	1	1500	Synchronous converter	600	12,500	35		
New York State Railways	1	1	250	Synchronous converter	600	11,000	25		
Chicago, North Shore & Milwaukee Railroad	1	1	500	Synchronous converter	600	33,000	25		November, 1918
Chicago, North Shore & Milwaukee Railroad	1	1	1000	Synchronous converter	600	13,200/33,000	25		
Omaha & Council Bluffs Street Railway	1	1	1000	Synchronous converter	600	13,200	25		
Chicago & Joliet Electric Railway	1	1	300	Synchronous converter	600	13,200	60		
Salt Lake, Garfield & Western Railway	2	2	600	Motor generator set	1500	44,000	60	One—remote control	
Oklahoma Union Railway	1	1	300	Synchronous converter	600	6,600	60		
Conestoga Traction Company	1	1	500	Synchronous converter	600	11,000	25		
New South Wales Government Railways	1	1	200	Synchronous converter	600	6,600	25	Remote control	
Duluth Street Railway	1	1	500	Synchronous converter	600	13,200	25		
Des Moines City Railway	1	1	500	Synchronous converter	600	2,250/4,500	25		
Cincinnati, Lawrenceburg & Aurora Electric Street Railway	2	2	200	Synchronous converter	600	33,000	60		
Duluth Street Railway	1	1	1000	Synchronous converter	600	15,200	25		
Pacific Electric Railway	1	1	1000	Synchronous converter	600	15,000	50		
Pacific Electric Railway	1	1	1000	Motor generator set	600	15,000	50		
Wisconsin Light, Heat & Power Company	1	1	300	Motor generator set	600	66,000	60		
Inter Urban Railway, Des Moines, Iowa	1	1	500	Synchronous converter	600	22,500	25		
Inter Urban Railway, Des Moines, Iowa	1	1	300	Synchronous converter	600	22,500	25		
Chicago, North Shore & Milwaukee Railroad	1	1	500	Synchronous converter	600	13,200/25,000	25		
Sacramento Northern Railway	1	1	300	Synchronous converter	600	2,300	60		

The Worst Year the Industry Has Experienced

Mileage Placed in Receivership in 1918 Is Three and a Half Times the Average for the Last Ten Years—Nearly 500 Miles and $16,525,000 of Capitalization Involved in Dismantlement or Suspension of Service

A HARD YEAR for electric railways—such must be the conclusion reached after a review of the receiverships, foreclosure sales and abandonments in the industry during 1918. The high cost of operation, owing to the increased prices of labor and materials, and the difficulty of securing compensatory revenues left many a company in a crippled condition. Of course the financial difficulties of some companies were the result of accumulated burdens of regulation, of unrestricted competition, of over-capitalization or of organization weaknesses, but the chances of such companies being able to effect satisfactory reorganizations so as to insure the continuance of service were greatly reduced during the last year on account of the decreased net earning power of the industry.

The year 1918 has resulted in more than the usual number of companies being operated or sold under court orders for the protection of investors or creditors. This fact, however, does not indicate the most significant phase of the situation. The big point in the year's record is that so many properties have grown weary from hope long deferred and have preferred dismantlement at present-day scrap prices rather than prolonged existence as losing ventures. Almost three score companies have suspended service in whole or in part, and in most cases they have dismantled or have secured permission to dismantle their lines. Sometimes the owners have voluntarily scrapped the properties; and sometimes, in the case of forced sales, the junk dealer has been the only bidder.

The total wrecks of the year, it will be noticed, were in the main small properties, and without a doubt some had probably been founded upon hopes rather than upon a sound knowledge of utility operation and community needs and thus had at best a restricted future. Yet all the abandoned companies had managed to live through other lean years, and their final collapse in 1918 is only cumulative evidence of the grievous burdens that today are bearing down upon every company, be it small or large.

These burdens, of course, have made themselves felt in different ways and in varying degrees for individual cases. The accompanying compilations are designed to cover all companies from those for which court aid was sought in 1918 to those whose car wheels then turned for the last time. These do not show to the full, however, the damage of 1918 to the industry, for many other companies are near the danger line as far as earning power, credit and adequate service are concerned. Many dividends have been cut or omitted; many interest payments have been allowed by bondholders to run at default in the hope of friendly readjustments, and many companies have announced that curtailment or suspension of service will be inevitable unless relief is granted. No effort has been made to tabulate such instances, but the fact that they exist is mentioned to make more emphatic the statement that the financial condition of all electric railways not included in the compilations can by no stretch of the imagination properly be considered as sound.

To take up the compilations in turn, consider first the receiverships. The accompanying record for the last ten years shows clearly the extent to which the number, the mileage and the capitalization of companies placed in receivers' hands in 1918 far exceeded those of 1915, the record year theretofore. The 1918 mileage was about three and a half times the average for the preceding nine years. The receivership of the Brooklyn Rapid Transit Company on the last day of 1918 naturally runs the totals for this year to a high figure, but even without this company the 1918 figures are in the main larger than in any preceding year. The mileage placed under receivership during 1918 represents more than 4 per cent of the total mileage of the country.

RECORD OF ELECTRIC RAILWAY RECEIVERSHIPS

	Number of Companies	Miles of Track	Outstanding Stock	Outstanding Funded Debt
1909	22	558.00	$29,962,200	$22,325,000
1910	11	696.61	12,629,400	75,490,735
1911	19	518.90	29,533,450	38,973,293
1912	26	373.58	20,410,700	11,133,800
1913	18	342.84	31,006,900	47,272,200
1914	10	362.39	35,562,550	19,050,460
1915	27	1,152.10	40,298,050	39,372,375
1916	15	359,26	14,476,600	10,849,200
1917	21	1,177.32	33,918,725	33,778,400
1918	29	2,107.61	92,130,388	163,257,102

It should be added that the receivership figures for 1917 have been adjusted to include the following cases, information about which was received too late for use in connection with last year's compilation: Abilene (Tex.) Street Railway—4.75 miles, $25,000 of stock and $30,000 of funded debt; Morgantown & Wheeling (W. Va.) Railway—27 miles, $345,800 of stock and $354,000 of funded debt; and Lewisburg (W. Va.) & Ronceverte Electric Railway—6.2 miles and $50,000 of stock.

Table I presents the details of electric railway receiverships in the last calendar year. An effort was made in every case to secure figures from the most up-to-date and authoritative source, and to obtain the correct data in case of disagreement among financial reports, a not infrequent occurrence. The railways thrown into receivers' hands in 1918 were in the majority of cases small in mileage. In each of nine receiverships, however, 48 miles or more of single track were involved, and in each of the two leading cases, Pittsburgh and Brooklyn, more than 600 miles.

Most of the receiverships were caused by a default in interest due to the generally disappearing margin between revenues and expenses, or to operation in territory of a poor character or to inherent defects in organization, or to a combination of these conditions, but in certain instances special reasons existed. For example, the Brooklyn Rapid Transit Company was confronted with large capital requirements for new construction, the possibility of heavy damages because of a recent severe accident, delay in the opening of vitally necessary sections of the new city rapid transit lines and opposition on the part of city officials to relief through a higher fare. The receivership in Des Moines was precipitated by a construction company after the company had for three months unsuccessfully tried to secure a higher fare. The Southern Traction Company, Inc., Bowling Green, Ky., was placed in receivership by the city, after service had been suspended, in order to prevent dismantlement if possible. Automobile competition brought the receivership of the Rockland, South Thomaston & St. George (Me.) Railway, and municipal restrictions that of the Fort Scott (Kan.) Gas & Electric Company, while the effort of the receiver of the Buffalo & Lake Erie Traction Company to abandon the lease of the Buffalo & Lackawanna Traction Company caused the latter company to be placed in the hands of a receiver.

RECORD OF ELECTRIC RAILWAY FORECLOSURE SALES

	Number of Companies	Miles of Track	Outstanding Stock	Outstanding Funded Debt
1909	21	468.00	$22,265,700	$21,174,000
1910	22	724.36	19,106,613	26,374,065
1911	25	660.72	91,354,800	115,092,750
1912	18	267.16	14,197,300	10,685,250
1913	17	302.26	15,243,700	19,094,500
1914	11	161.26	26,239,700	44,094,241
1915	19	308.31	30,506,817	16,759,997
1916	19	430.14	13,695,400	22,702,300
1917	26	745.19	27,281,900	27,313,045
1918	23	524.22	37,740,325	20,149,364

A 1918 receivership not included in the list is that of the Washington Electric Railway, Chehalis, Wash. The reason for the omission is that this company in 1916 disposed of its 19-mile line to the Cowlitz, Chehalis & Cascade Railway, which is now operating the line, and the receivership of the predecessor company is simply for the purpose of making a final settlement of its corporate affairs.

The foreclosure sales in 1918, as shown by the accompanying record for the past decade, were of more than average importance. Although the number of companies and the mileage involved were less than in 1917 (which year is adjusted to include the belated return of the South Fork-Portage Railway with 7.5 miles, $150,000 of stock and $230,000 of bonds), the capitalization in 1918 was greater. Moreover, the 1918 figures generally exceeded those for the other years before 1917 with the exception of 1910 and 1911. Two factors have undoubtedly tended during 1918 to keep the foreclosure sales from numbering even more than they did—first, the fact that financial conditions rendered difficult of accomplishment the readjustments that usually accompany the foreclosure sales of large properties and thus made advisable the continuation of some receiverships until more settled times; and second, the fact that more than a few companies deemed their situation so hopeless that they voluntarily went out of business without going through receivership and forced sale.

The detailed foreclosure sales are shown in Table II, in the preparation of which all the various forms of reorganization, readjustment and change in ownership without formal foreclosure sales were passed over. The

TABLE I—ELECTRIC RAILWAY RECEIVERSHIPS IN 1918.

	Miles	Outstanding Stock	Outstanding Funded Debt
Binghamton (N. Y.) Ry	49.74	$978,995	$2,390,000
Brooklyn (N. Y.) Rapid Transit Co	754.82	75,571,368	119,588,927
Buffalo & Depew Ry., Buffalo, N. Y.	13.59	305,000	350,000
Buffalo & Lackawanna Traction Co., Erie, Pa. (a)	8.80	100,000	1,000,000
Claremont (N. H.) Railway & Lighting Co.	8.60	160,000	150,000
Columbus, Magnetic Springs & Northern Ry., Richwood, Ohio (b)	16.50	230,000	250,000
Consolidated Street Ry., Strong City, Kan.	2.00	10,000	None
Cumberland Ry., Carlisle, Pa	12.40	350,000	404,700
Denver & Interurban R.R., Denver, Colo	51.94	101,500	1,079,000
Des Moines (Ia.) City Ry	65.00	1,305,000	5,995,000
Evansville (Ind.) Rys.	61.50	1,519,400	2,129,000
Fort Scott (Kan.) Gas & Electric Co. (c)	7.00	116,700	97,000
Hartford & Springfield Street Ry., Warehouse Point, Conn	48.00	765,000	961,000
Iola (Kan.) Electric R.R.	10.50	150,000	150,000
Lewiston, Augusta & Waterville Street Ry., Lewiston, Me	165.65	3,000,000	3,659,000
Memphis & Rugby (Tenn.) Ry	2.50	......	80,000
Paducah (Ky.) Traction Co.	19.34	350,000	1,023,000
Penn Yan (N. Y.) & Lake Shore Ry.	10.00	94,000	100,000
Pittsburgh (Pa.) Rys	605.25	5,000,000	18,534,000
Plymouth & Sandwich (Mass.) Street Ry	17.43	151,800	None
Rockland, South Thomaston & St. George Ry., Rockland, Me	5.71	122,400	37,575
St. Joseph Valley Traction Co., Elkhart, Ind.	9.00	110,200	240,000
St. Paul (Minn.) Southern Electric Ry.	17.54	658,225	364,400
St. Petersburg (Fla.) & Gulf Ry.	26.11	300,000	250,000
Scranton (Pa.) & Binghamton R.R.	50.00	250,000	4,100,000
Southwestern Interurban Ry., Winfield, Kan	25.00	150,000	50,000
Southern Oregon Traction Co., Medford, Ore.	6.19	150,000	150,000
Southern Traction Co., Inc., Bowling Green, Ky. (d)	4.50	10,000	24,500
Springfield (Vt.) Electric Ry	9.00	100,600	100,000
	2,107.61	$92,130,368	$163,257,102

(a) Receivership resulted from petition of receiver of Buffalo & Lake Erie Traction Co. to abandon its lease of the Lackawanna line.

(b) Sale has been set for Jan. 15, 1919. See "Suspensions" in Table of Abandonments.

(c) Railway investment represents approximately one-third of company capitalization.

(d) This company suspended service in 1917, but the city has caused a resumption of service under a receiver.

TABLE II—ELECTRIC RAILWAY FORECLOSURE SALES IN 1918

	Miles	Outstanding Stock	Outstanding Funded Debt
Adirondack Lakes (N.Y.) Traction Co.	5.00	$60,000	$94,000
Central Crosstown R.R., New York, N. Y. (a)	6.32	1,250,000	3,570,809
Cincinnati, Milford & Loveland (Ohio) Traction Co.	37.00	1,649,425	441,000
Claremont (N. H.) Ry. & Lighting Co.	8.60	160,000	150,000
Consolidated Street Ry., Strong City, Kan.	2.00	10,000	None
Eastern New York R.R., Ballston Spa, N. Y.	15.00	275,000	150,000
Freeport (N. Y.) R.R.	2.92	20,000	50,000
Lewisburg & Ronceverte Electric Ry., Lewisburg, W. Va	6.20	50,000	None
Memphis & Rugby (Tenn.) Ry	2.50	......	80,000
Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Co., (b)	42.00	6,248,250	750,000
Northern Cambria Street Ry., Patton, Pa	13.00	431,750	395,000
Northern Electric Ry., Chico, Cal.	217.65	25,000,000	12,137,000
Orleans-Kenner Electric Ry., New Orleans, La.	11.60	250,000	250,000
Petaluma & Santa Rosa (Cal.) Ry.	43.41	994,100	672,000
Rockland, South Thomaston & St. George Ry., Rockland, Me.	5.71	122,400	37,575
St. Joseph Valley Traction Co., Elkhart, Ind.	9.00	110,200	240,000
St. Louis, Lakewood & Grant Park (Mo.) Ry. (c)	4.00	300,000	85,000
San Angelo (Tex.) Power & Street Ry. Co. (d)	1.00	25,000	None
Selma (Okla.) Street & Suburban Ry.	8.00	125,000	125,000
Southwestern Interurban Ry., Winfield, Kan.	25.00	150,000	50,000
Ware & Brookfield (Mass.) Street Ry.	11.71	100,000	135,000
Woodstock & Sycamore Traction Co., Genoa, Ill	26.50	292,600	485,000
Worcester & Warren Street Ry., Brookfield, Mass.	20.10	116,600	52,000
	524.22	$37,740,325	$20,149,364

(a) The sale covered the lease of the Christopher & Tenth Street Railroad, which is included.

(b) A 14-mile section of this road was sold to bondholders in 1917 and included in the 1917 Table of Foreclosure Sales. The other part was sold in 1918 to an organization of citizens along the line. They then bought in the 14-mile section, and the whole property is now in the hands of a reorganized company, the Minneapolis, Northfield & Southern Railway.

(c) Not in operation since flood of 1915.

(d) This company abandoned service in 1916 and disposed of most of its 4-mile property. The remainder came into possession of the city under an agreed judgment of the district court and was sold in 1918 to the San Angelo Water, Light & Power Company. This company has relaid some track in connection with street paving but has not yet operated its 1 to 1½ mile line.

items in the table generally speak for themselves, but a few special points merit comment. The Northern Electric Railway sale was the culmination of a reorganization pending since 1914. The part of the Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company not sold in 1917 was sold this year and, as explained in detail in the note in the table, has been reunited in a new company with the other section. The Claremont (N. H.) Railway & Lighting Company was purchased by local manufacturers to save the line. The majority of the properties foreclosed in 1918 are still operating in some reorganized or new form, but nine out of the total of twenty-three either went on to the junk dealer or seem headed in that direction.

These wrecked companies, together with those whose abandonment in 1918 was a voluntary act or the aftermath of receivership and sale in prior years, are shown in Table III. An effort was made to segregate abandoned companies into two classes, the first, or "Dismantlements;" including properties actually scrapped in whole

TABLE III—ELECTRIC RAILWAY ABANDONMENTS IN 1918

1. Dismantlements	Miles	Outstanding Stock	Outstanding Funded Debt
Adirondack Lakes (N.Y.) Traction Co.	5.00	$60,000	$94,000
Billings (Mont.) Traction Co. (*a*).....	6.00	100,000	None
Bluffton (Ind.), Geneva & Celina Traction Co....................	19.00	675,000	None
Bristol (Tenn.) Traction Co. (*a a*)....	15.30	143,800	192,500
Carolina Traction Co., Rock Hill, S. C. (*b*)..........................	3.00	....	....
Clarkesville (Ga.) R.R...............	1.25	....	....
Central of Florida Ry., Daytona, Fla.	5.00	130,000	100,000
Consolidated Street Ry., Strong City, Kan..........................	2.00	10,000	None
Covington & Oxford (Ga.) Street Ry.	6.00	13,600	None
Dayton, Springfield & Xenia Southern Ry., Dayton, Ohio (*c*)............	12.00	159,425	150,100
Denton (Tex.) Traction Co..........	4.50	....	....
Gettysburg (Pa.) Ry...............	6.50	50,000	47,000
Interurban Ry. & Terminal Co. Cincinnati, Ohio (*d*)..............	23.00	946,750	446,325
Lake Erie, Bowling Green & Napoleon Ry., Bowling Green, Ohio (*e*)......	12.50	346,000	218,600
London & Lake Erie Ry. & Transportation Co., London, Ont.......	28.00	2,000,000	840,000
Martha's Vineyard (Mass.) Street Ry.	1.10	8,000	None
Memphis & Rugby (Tenn.) Ry.......	2.50	....	80,000
Middletown (Ohio) Street Ry........	1.00	....	....
Montecito R.R., Los Angeles, Cal.....	1.46	20,000	None
New Jersey Rapid Transit Co., Sea Isle City, N. J..................	8.00	200,000	120,000
Northwestern Traction Co., Braxil, North Dakota..................	5.00	....	....
Norwood, Canton & Sharon Street Ry., Foxboro, Mass. (Norwood Division) (*f*).................	2.50	12,500	11,500
Oak Bluffs (Mass.) Street Ry........	6.47	60,000	None
Oklahoma Union Ry., Sapulpa, Oklahoma (*g*)..................	1.50	24,000	....
Richmond (Va.) & Rappahannock River Ry. (*h*)	16.30	321,000	314,580
Rockland, South Thomaston & St. George Ry., Rockland, Me........	5.71	122.400	37,575
Rutland Ry., Light & Power Co., Rutland, Vt......................	†2.50	120,000	75,000
St. Joseph Valley Traction Co., Elkhart, Ind. (*i*)..................	7.50	110,200	240,000
St. Louis, Lakewood & Grant Park Ry. (*j*)........................	4.00	300,000	85,000
St. Simons R.R., Brunswick, Ga....	1.70	12,000	18,000
Sand Point (Ida.) & Interurban Ry., Ltd..........................	6.00	312,100	None
Sioux City, Crystal Lake & Homer Elec. Ry., Dakota City, Neb......	4.00	50,000	10,300
San Jose (Fla.) Traction Co., Jacksonville, Fla.....................	3.00	*50,000	None
Taunton & Pawtucket Street Ry., Taunton, Mass., (*k*)..............	14.00	100,000	200,000
Topeka (Kan.) Ry.................	†1.50	45,000	39,600
Twin Falls (Ida.) R.R..............	12.00	*500,000	250,000
Uvalde & Leona Valley (Tex.) Interurban Ry......................	8.00	32,000	*26,000
Ware & Brookfield (Mass.) Street Ry..........................	11.71	100,000	135,000
Woodstock & Sycamore Traction Co., Genoa, Ill.....................	26.50	292,600	485,000
Worcester & Warren Street Ry., Brookfield, Mass................	20.10	116,600	52,000
Yazoo (Miss.) Municipal Street Ry...	4.00	....	50,000
Total dismantlements............	327.10	$7,542,975	$4,318,080
2. Suspensions			
Bay State (Mass.) Street Ry. (*l*).....	†30.40	$834,000	$827,700
Berkshire (Mass.) Street Ry. (*m*)......	†5.05	69,215	69,215
Bristol & Norfolk Street Ry., Randolph, Mass. (*m m*)..........	6.44	100,000	70,000
Columbus, Magnetic Springs & Northern Ry., Richwood, Ohio (*n*).	18.50	230,000	250,000
Conway (Mass.) Electric Street Ry...	6.60	100,000	100,000
Fernandina (Fla.) Municipal Ry.....	2.00	....	None
Fort Scott (Kan.) Gas & Electric Co. (*o*)........................	7.00	116,700	97,000
Fryeburg (Me.) Horse R.R. (*p*)......	3.00	5,175	None
Hamilton (Ont.) Radial Elec. Ry. (*pp*)	29.10	111,150	160,000
Laconia (N. H.) Street Ry. (*q*).......	†1.30	20,580	19,250
Lebanon & Franklin Traction Co., Dayton, Ohio..................	10.80	80,000	135,000
Madison Light & Ry. Co., Madison, Ind. (*r*)........................	3.50	150,000	146,000
Mt. Vernon (Ohio) Ry. (*s*)..........	9.00	10,000	40,000
Norwood, Canton & Sharon Street Ry., Foxboro, Mass. (Sharon Div.) (*t*)	4.00	20,000	18,500
Ocean City (N. J.) Electric R. R. (*t t*)	10.00	100,000	75,000
Oxford Electric Co., Norway, Me. (*u*)	2.13	80,000	175,000
Parkersburg (W. Va.) & Ohio Electric Ry., (*r*).......................	5.00	150,000	150,000
Plymouth & Sandwich (Mass.) Street Ry., (*w*).......................	17.43	151.800	None
Total suspensions...............	171.25	$2,328,620	$2,332,665
Grand total......................	498.35	$9,871,595	$6,650,745

* Authorized amount; outstanding amount not ascertainable.

† This represents only a small fractional abandonment; in other words, almost all of the old mileage of this company is still in operation.

(*a*) Partially dismantled in 1917; heirs of chief stockholder refuse to operate losing line, and the property remaining is for sale.

(*a a*) This company suspended service in 1917. Early in 1918 an effort was made to operate the outlying 10-mile Holston Valley division, but now this and the city lines have both been dismantled.

(*b*) The company's three storage battery cars have been sold, but the tracks and charging plant have not yet been removed.

(*c*) The branch line from Beavertown to Spring Valley has been torn up. The company's remaining trackage, 27.97 miles, is being operated.

(*d*) Dismantled section represents Bethel division only. The company still operates 62 miles.

(*e*) The company was sold in 1916, with the option to junk. The 12-mile section between Bowling Green and Pemberville was sold to and is being operated by the Toledo, Fostoria & Findlay Railway. Dismantlement was begun on the remaining part, but the final authorization for junking was not received from the Ohio Supreme Court until 1918.

(*f*) See same company in "Suspensions" below. Service on the whole 6.5 mile line was suspended in March, and in this month the company was sold, not at public auction, to a New Jersey syndicate represented by a Mr. Tarr of Boston. The 2.5 mile Norwood division has been junked, but the 4-mile Sharon division lies untouched at the moment.

(*g*) Abandoned under commission order because controlled Sapulpa Electric Interurban Railway served same territory for slightly greater distance.

(*h*) A 9 10 mile section of this 25.40 mile property, which went into receivership in 1917, was sold under court decree in 1917 to the Richmond & Seven Pines Railway. The remainder is now abandoned as the result of the voluntary dissolution of the Richmond & Rappahannock Railway.

(*i*) See this company in Table of Receiverships and Table of Foreclosure Sales. The whole line was sold to a junking company, but W. H. Foster, mayor of Elkhart, purchased a 1½ mile section in that city and is now operating it.

(*j*) Not in operation since flood of 1915.

(*k*) This company's 17.5 mile line was all sold in 1917 under the unsatisfied mortgage of the predecessor company, the Bristol County Street Railway, and all has now been abandoned except a 3.5 mile section purchased by the city of Attleboro for $18,000 to form the "A. B. C. Railway."

(*l*) In March the court authorized the discontinuance of 125 mi. of unprofitable lines, but up to the latest report furnished only 30.4 of unsafe track had actually been closed down. A petition, however, for the discontinuance of 288.2 miles at least during the winter months because of failure to earn operating expenses is now pending.

(*m*) Operation temporarily suspended on line from Lanesboro to Cheshire. Capitalization represented is arbitrarily halved between stock and bonds. Line from East Lee to Huntington, 23.84 miles, is not included as the express service is still in operation, although all passenger service has been discontinued.

(*m m*) The securities of this company were purchased at a private sale by junk dealers. Service was suspended on Dec. 2, and it is the intention to foreclose soon.

(*n*) Service suspended on Dec. 31, 1918; sale set for Jan. 15, 1919.

(*o*) Railway investment represents approximately one-third of company capitalization.

(*p*) Railway has gone out of business as far as operation is concerned but still holds its organization and charter for electric line.

(*p p*) Complete suspension followed failure to secure higher fare. It is reported that proceedings are being taken to declare the company insolvent and that dismantlement will probably result in this event.

(*q*) An effort is being made to save the remainder of this 8.87-mile line through reorganization of service and finances.

(*r*) The intention to discontinue service was announced last August, and according to advice late in December formal permission was about to be granted.

(*s*) This line was sold for junk in 1917 and included in the Table of Abandonments of that year. The dismantling, however, was stopped late in 1918 by an injunction from the Ohio Supreme Court.

(*t*) See same company in "Dismantlements" above. The company last March was notified not to resume operation until re-inspected by the Massachusetts Public Service Commission, for the roadbed was said to be in a dangerous condition.

(*t t*) Company suspended service in October, 1918, and says that it will not operate again. Committee of local business men is trying to interest capital for purchase of the property.

(*u*) It is expected that this suspension will result finally in dismantlement and sale.

(*v*) Sale is awaiting decision by federal courts; receiver, who has been in power since 1911, states that line will be dismantled.

(*w*) Property is awaiting decision of Massachusetts Supreme Court relative to writ of mandamus to compel town of Plymouth to keep its promise to pay the road $50,000 toward the construction of 11.5 mile extension (total cost, $250,000) from Fresh Pond to Sagamore completed in 1916. Town voted to contribute this sum, but selectmen refused to obey vote, and service was suspended pending settlement of matter in the courts.

or in part, in the process of being so scrapped or with the necessary legal sanction for such treatment, as well as certain small companies which are known to be out of business and of which nothing can be learned to give hope of a reopening. The second class, or "Suspensions," includes those companies whose service has been in whole or in part discontinued either temporarily or permanently, but which in the latter event have not received the necessary permission for dismantlement.

In 1918 the number of companies involved in dismantlements and suspensions was about three times as large as in 1917, and the mileage and the capitalization concerned were about two-and-a-half times as great. The following record of the last two years tells a plain story of increased burdens:

		Number of Companies	Miles of Track	Outstanding Stock	Outstanding Funded Debt
1917	Dismantlements...	13	126.97	$2,048,900	$2,006,450
	Suspensions.......	7	80.51	1,173,300	1,542,000
	Total...........	20	207.48	$3,222,200	$3,548,450
1918	Dismantlements...	41	327.10	$7,542,975	$4,318,080
	Suspensions.......	18	171.25	2,328,620	2,332,665
	Total...........	59	498.35	$9,871,595	$6,650,745

It will be observed that Table III includes a few operating companies which—the Bay State Street Railway is the leading example—abandoned a small part of their lines in 1918 and even in some cases scrapped this part of their properties. The list of cases of this sort is not intended to be complete, for no canvass has been made of all operating companies to ascertain to the last inch how much track has been torn up or allowed to become a streak of rust. The cases cited are those which have attained prominence before commissions, courts or city authorities, and they are included merely to indicate the necessity which companies feel of curtailing unprofitable service. The capitalization in these cases is prorated on a mileage basis.

Regarding the seven companies reported in last year's list of suspensions, it may be said that three have since been dismantled, the Bristol (Tenn.) Traction Company, the Bluffton, Geneva & Celina Traction Company and the Taunton & Pawtucket Street Railway. The Richmond & Chesapeake Bay Railway has not resumed service, but at a recent sale all bids were refused because no one would state an intention to operate the line. The Fort Smith-Oklahoma Light & Traction Company is likewise still existent but inoperative, and there is said to be no indication of a resumption of service in the near future. As before stated, the Southern Traction Company, Inc., Bowling Green, Ky., is being operated by a receiver. The Amarillo (Tex.) Street Railway has not yet resumed operation.

The special circumstances attaching to individual cases of dismantlement or suspension in the 1918 table are believed to be sufficiently explained in the notes, but a few references to companies not included in the table will be used to complete the story as follows:

The 1917 purchasers of the Southwestern Traction Company, Temple, Tex., have been desirous of dismantling the property, but suspension of operation has been prevented by an injunction secured by citizens, city councils and county officials in the company's territory.

The Gary & Interurban Railroad, Gary, Ind., sold in 1917, was succeeded by the Gary Street Railway as far as the original Gary & Interurban and the controlled East Chicago Street Railway lines were concerned. A third constituent part of the old system, the Goshen, South Bend & Chicago Railway, was included in the 1917 Table of Abandonments; and the remaining sections, the Gary Connecting Railways and the Valparaiso & Northern Railway, seemed destined also to meet an early end. The Gary & Valparaiso Railroad, however, was incorporated to operate these last two lines pending an appeal to restrain dismantlement, and during 1918 this company has been aided by the government in its rehabilation work, as described elsewhere in this issue.

The Dunkirk (N. Y.) Street Railway, after repeated efforts, has at last secured permission from the Public Service Commission for the Second District of New York to abandon parts of its system, with an "if" attached. The commission's order is not to become effective until certain security is given to the city for taxes and until the receiver of the holding company, the Buffalo & Lake Erie Traction Company, obtains authorization from the Supreme Court for the abandonment.

The California Railroad Commission has just granted the owners of the Fresno Interurban Railway the right to suspend passenger service on its line in the city of Fresno. Like the Berkshire Street Railway line noted in Table III, however, the Fresno company is not included in the list of suspensions because some class of service is still maintained, this being freight service to the end of its 15-mile line.

In New York State numerous petitions have been presented to the Second District Commission for approval of declarations to abandon parts of lines. The Fishkill Electric Railway, the New York, Westchester & Connecticut Traction Company, the Yonkers Railroad and the Westchester Electric Railroad have all taken this step, but the applications are still pending. The three companies last named are controlled by the Third Avenue Railway, New York, N. Y.

Other petitions for the abandonment of certain portions of the property are pending before the courts or the commissioners in the cases of the Danbury & Bethel (Conn.) Street Railway; the Washington Water Power Company, Spokane, Wash.; the Los Angeles (Cal.) Railway; the Kansas Electric Utilities Company (Parsons Division), and the Exeter, Hampton & Amesbury Street Railway, Exeter, N. H., In addition the Indiana Utilities Company has a case pending before the State commission for the abandonment of the Angola-Lake James railway property, and the Los Angeles & San Diego Beach Railway one before the California Railroad Commission for complete discontinuance of service and dismantlement.

The twelfth year of operation of the tramways in Penang, Straits Settlement, was somewhat uneventful, the usual services being maintained without accident or serious interruption. The revenue totaled $87,275 (gold), and the gross profit was 10 per cent. The number of passengers carried showed a satisfactory increase, but enhanced prices had to be paid for all materials, and no work of a capital nature was carried on owing to the impossibility of obtaining materials. An electric locomotive to deal with freight haulage was ordered from America.

Electric Railway Statistics

Figures Are Given by States of the Miles of Track and Numbers of Cars Owned

THE accompanying table gives statistics of the miles of track and cars of the electric railway companies in the United States, made up from the August, 1918, "Electric Railway Directory" of the McGraw-Hill Company. The dates of the reports in this directory average about June, 1918, so that the table may be considered to represent the statistics of the industry at about that time.

A comparison of the totals given in this table with those in a somewhat similar table, published in the issue of Jan. 5, 1918, will show that for all states a total of 991 companies instead of 1,029, a decrease during the year of 38. The miles of track this year total 48,484 as compared with 48,175 in June, 1917, an increase during the year of 209, and the motor passenger cars this year total 80,270 as compared with 81,393, last year, a decrease of 1,123. The total number of cars, according to the table, increased from 102,359 to 102,379, or a total of 20. The decrease in the number of companies is due in part to the abandonment of operation of electric lines by companies which had not found the service financially profitable, and in a number of cases to the abandonment of gasoline motor lines. There were a few consolidations and also several cases of the splitting up of former consolidated properties by action of the court or for some other reason. Some of these cases of segregation have brought changes in the mileage credited to the different states, because, under the plan followed, the miles of track and number of cars belonging to each company are credited to the state in which the greater part of the mileage lies. Nominally there has been an increase of 200 miles, but this increase is not significant, in the opinion of the compilers, as it is less than one-half of 1 per cent, and owing to the unavoidable limitations in the method of compiling the statistics, accuracy within that figure is not claimed. The same statement applies to the figures on cars. This is one reason why an attempt should not be made to establish a very close comparison between the figures in this table and in those elsewhere in this issue on track built and abandoned and cars purchased during the year. Another reason of course is the difference in period, the other tables being for the calendar year while these are approximately for the year ended in June. The figures do not differ greatly, however, indicating that all are approximately correct.

A few other words of explanation are necessary. The electrified mileage of steam railroads is included, but as this is reported to the Directory usually as route mileage, that figure is continued in the table, although the mileage of the city and interurban companies is figured as single track as usual. Under "Cars" the statistics include for electrified steam railroads only the electric locomotives and the motor passenger cars. Gasoline motor cars are classified under the head of "motor passenger cars."

Many companies seem to use the expressions "express cars," "freight cars," and "service cars" as interchangeable terms. The table shows the way in which cars of these types are reported by the different companies, but what is known as a service car on one road may be called a freight car or an express car by another road. In a few cases where a company owns a large number of freight cars compared with the number of passenger cars owned, the total number of such freight cars has been intentionally omitted from the table. The most notable instances of this are the Chicago Tunnel Company with 3000 "other" cars, the Fort Dodge, Des Moines & Southern Railway with 2,300 "other" cars and the East St. Louis & Belleville Electric Railway with 510 "coal" cars. In fact, "other cars" as reported by a company may mean almost anything other than motor cars.

Every effort was made to prevent duplication of mileage and cars when reported by a holding company and again by an operating company, but there may be certain cases of this in the table.

TABLE SHOWING STATISTICS OF ELECTRIC RAILWAY COMPANIES IN THE UNITED STATES

	No. of Cars	Miles of Track	Motor Passenger Cars	Trail Passenger Cars	Electric Locomotives	Express or Freight Motor Car	Freight Cars	Service or Other Cars	Horse or Cable Cars
New England States:									
Connecticut...	7	1,608	1,922	3	104	300	.....	123	....
Maine........	16	535	511	8	11	85	30	151	.....
Massachusetts.	39	3,227	7,873	354	9	29	33	1,076	....
New Hampshire	14	248	285	.....	2	6	.....	41	2
Rhode Island..	3	428	1,030	25	...	...	.....	246	....
Vermont......	10	128	131	.....	...	1	12	14	....
Total.......	89	6,174	11,752	390	126	421	75	1,651	2
Eastern States:									
Delaware......	2	153	309	.....	...	...	.....	81	....
District of Columbia......	8	425	1,066	.....	...	...	.....	438	....
Maryland.....	12	685	2,114	54	13	19	70	92	....
New Jersey....	29	1,595	3,285	3	2	19	4	77	....
New York.....	105	5,633	16,989	1,228	151	65	35	2,116	2
Pennsylvania..	122	4,746	8,154	23	3	24	86	1,365	4
Virginia.......	13	581	891	63	...	14	....	117	....
West Virginia..	21	652	574	.....	12	20	5	53	....
Total.......	312	14,470	33,382	1,371	181	161	200	4,339	6
Central States:									
Illinois........	70	3,757	5,999	701	52	9	1,125	517	....
Indiana.......	41	2,463	1,730	28	39	85	.....	455	....
Iowa..........	24	885	967	13	16	3	.....	354	....
Kentucky.....	10	464	1,005	14	...	12	.....	70	....
Michigan......	26	1,736	2,384	57	16	80	.....	598	....
Minnesota.....	14	737	1,320	4	7	1	.....	171	....
Missouri......	22	1,137	2,512	144	1	...	.....	285	....
Ohio..........	72	4,254	5,501	89	14	59	24	1,285	....
Wisconsin.....	18	763	913	117	2	67	.....	79	....
Total.......	297	16,196	22,331	1,167	147	316	1,149	3,814	....
Southern States:									
Alabama......	15	365	411	28	...	...	....	248	....
Arkansas......	10	122	242	.....	...	...	....	44	....
Florida........	9	191	289	13	...	1	....	41	....
Georgia.......	16	499	679	19	...	26	....	58	2
Louisiana.....	11	330	687	....	...	3	....	135	....
Mississippi....	11	120	150	2	...	...	....	24	....
North Carolina	12	285	314	....	16	1	8	195	....
South Carolina.	5	129	188	25	...	...	....	.....	....
Tennessee.....	14	482	799	57	1	13	3	74	....
Total.......	103	2,523	3,759	144	17	44	11	819	2
Western States:									
Arizona.......	4	54	44	1	...	...	....	1	....
California.....	38	3,313	3,733	84	66	9	467	1,531	119
Colorado......	13	494	415	149	6	57	....	206	2
Idaho.........	5	185	61	2	3	...	....	22	....
Kansas.......	17	546	411	14	...	...	12	157	3
Montana......	9	663	134	20	42	32	....	17	....
Nebraska......	6	253	578	10	1	...	....	65	....
Nevada.......	2	11	12	....	...	...	....	...	....
New Mexico...	2	11	16	....	...	...	....	...	....
North Dakota..	4	27	58	....	...	...	....	8	....
Oklahoma.....	16	312	301	....	...	...	....	73	....
Oregon........	10	682	721	85	22	26	449	206	....
South Dakota..	3	25	30	4	...	1	....	8	....
Texas.........	34	1,001	1,221	134	...	31	....	162	....
Utah..........	5	453	269	....	7	2	....	251	....
Washington....	20	1,069	1,027	28	27	7	442	483	48
Wyoming......	2	22	15	10	...	...	....	4	....
Total.......	190	9,121	9,046	541	174	165	1,310	3,194	172
Total of all States.....	991	48,484	80,270	3,613	645	1,107	2,745	13,817	182

Railway Conditions are Encouraging

War Has Proved Need of Public for Dependable Service—Some Sort of Service-at-Cost Plan of Operation Favored

By CLARENCE RENSHAW
General Engineer Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

THE beginning of the new year on a peace basis finds the electric railways with much to be thankful for. While in many cases their revenues are shamefully inadequate, their physical property run down and their working forces depleted by the severe strains they have been through, there is every reason to believe that the bottom has at last been reached, and that the future will bring improvement.

The war has brought many hardships to the industry, but it has also destroyed several handicapping prejudices which had seemed so deep-rooted as to be almost impregnable, and in their place it has established some valuable precedents. Its effects, therefore, have not been entirely without compensation.

Among the most important of the ideas which have been relegated to the past is the mysterious idealization of the nickel as the necessarily logical unit of car fare and the strong conviction that only a single unit should be charged within the boundaries of a given municipality, no matter how great the mileage. The necessity for stopping the cars at every street corner, also, regardless of the fact that in many cases these corners are only five or six car lengths apart, has likewise been removed and a rational basis generally recognized for the location of stopping points.

IMPORTANT PRECEDENTS ESTABLISHED

In the matter of precedents the national recognition which has been given to the necessities of the electric railways and to the value of their services is an important item. It is stated on reliable authority that of the 158 cities having a population of 40,000 or more, increased rates in one form or another have been granted in ninety, or nearly 60 per cent, and that they are pending in fifty-one others. In many instances, it is true, the granting to the railway companies of the increased rates for which they asked has not proved a solution of their financial problems. However, the recognition of the fact that rates must be adjusted to meet costs, which these increases have shown, is extremely encouraging, especially in view of the idea previously prevalent that fares could be changed in the downward direction only.

The most convincing testimonial, perhaps, as to the value of local transportation has been the loaning to electric railways in various parts of the country, by at least two different departments of the national government, of money at reasonable interest where such financing was necessary to secure service for important industries. Another encouraging recognition of the same sort was the practice adopted by manufacturers in many cases of loaning men from their own forces to the railway companies for operating cars during the rush hours. The difference between the amounts paid these men by their employers and those refunded by the railway companies, often amounting to nearly $5 a day per car, was cheerfully assumed under the circumstances as a legitimate charge for readiness to serve. These practices, moreover, are not merely recognitions of service. They are precedents which will be carefully borne in mind on account of their possible bearing on the ultimate solution of the transportation problem.

With such a background, there is every reason why the electric railways should attack their problems in a spirit of optimism. Never before has the idea of justice and fairness been so noticeable among the people and their representatives as now at the conclusion of a war entered for the sake of these principles. Never before has the management of the railways been controlled by such broad-minded and skillful executives, and never before have the manufacturers of equipment been so adequately prepared to supply the physical needs of the industry. What the results will be it would, of course, be rash to predict. Certain tendencies, however, can be recognized with a fair degree of certainty.

TENDENCY IS TOWARD SERVICE AT FAIR RATES

The general trend in public relations will apparently be away from the municipal franchise with its ironclad provisions and toward state control by the more flexible commission form. In those cases where previous relations have been severely strained, the tendency will be to adopt some form of service at cost with more or less fixed guarantees of capital return. Where conditions have been better, however, and proper technical skill is utilized, it will most likely be feasible to devise means for profitable operation under present forms of control.

To operate successfully under the latter alternative, commercial methods must be more generally adopted. Service of the proper kind, not too much nor too little, but rightly gaged to the needs of the community, must not only be given but must be widely advertised. Reliable, rather than cheap equipment, must be employed with train operation, one-man cars and other modern devices where necessary. Obviously, this will mean highly-trained men in both traffic and mechanical departments. Rates properly proportioned to encourage maximum use of the transportation for sale will likewise be an essential element. Restrictive legislation will not handicap any railway which operates on this basis, for, presenting the case in its bearing on service to the people rather than its effect on the company, it will be able to secure any enactment for which it asks.

On either basis the electric railways in the future will undoubtedly be run for the benefit of the community, and this being properly made known with suitable publicity of all matters of management, the people will be entirely willing to pay the necessary price.

The importance of studying the employees outside of working hours was emphasized in some remarks recently made by Edward Marshall before the station operating committee of the Ohio Electric Light Association. He said, "Do you think most of us give our help the proper consideration and attention? Should we not have in each plant some one whose duty it is to investigate each employee's home life and the conditions under which he labors? Should we not know whether our employees are living economically? We all know that a man in debt is not a good employee. Some system of education and relief for such should be provided."

Renewing "K" Controller Shafts and Handles

The Position of Controller Contacts Should Be Located Accurately from the Machined Portion of the Shaft

By R. S. Beers
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THE handles of most "K" controllers are made removable, which requires that the hole in the handle be slightly larger than the shaft. The continual use of the operating handle increases this difference in size, until in extreme cases the fit may become so loose that the controller cannot be turned fully "on" or "off." Usually, rebushing the handle will be found sufficient to correct the trouble.

But in other cases where the shaft is badly worn it may be brought back to its original dimensions by cutting off the worn end and drilling a hole to receive a new shaft end as indicated by Fig. 1. The part that goes in the hole of the old shaft should be turned to a drive fit.

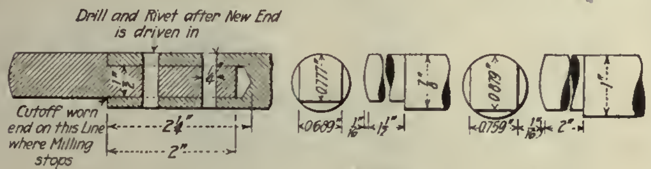

Drill and Rivet after New End is driven in
Cutoff worn end on this Line where Milling stops
2¼"
2"
1"
¼"
.0777"
.0689"
15/16
1½"
⅞"
.0879"
.0759"
15/16
2"
1"

FIG. 1 FIG. 2 FIG. 3

METHOD FOR RENEWING "K" CONTROLLERS AND HANDLES

Fig. 1—Method of renewing handle fit on controller shaft. Flg. 2—Handle end of shaft for K-10, K-11, K-12, K-27 and K-63 controllers. Flg. 3—Handle end of shaft for K-6, K-28, K-29, K-36, K-36, K-40, K-51 and K-66 controllers

A simple plan for locating the new shaft end is to put the cylinder in a controller frame, with the pawl in the "off-position" notch of the star wheel. Then the new shaft end is put into a new handle, the handle is set in the "off position" as indicated by the "off-position" stop on the cap plate and the new shaft end is driven into place. After it is driven in, the shaft is removed and drilled and the new end is pinned to the old shaft. This method of repairing removes the oil-way to the upper bearing but a substitute oil-way can be made by drilling a small hole through the water cap.

A second and much more difficult method of repair is to build up the shaft end with a welding outfit. This has the advantage of maintaining the original strength of the shaft as well as the oil-way to the upper bearing. It has the disadvantage, however, of requiring that, while the weld is being made, the shaft be kept cool where the insulation begins. In addition it is necessary, on the repaired cylinder, to machine the end for the handle in a milling machine having an index head, or else an angle plate and surface gage must be used. Care must be taken to insure that the flat surface for the handle will be correctly located.

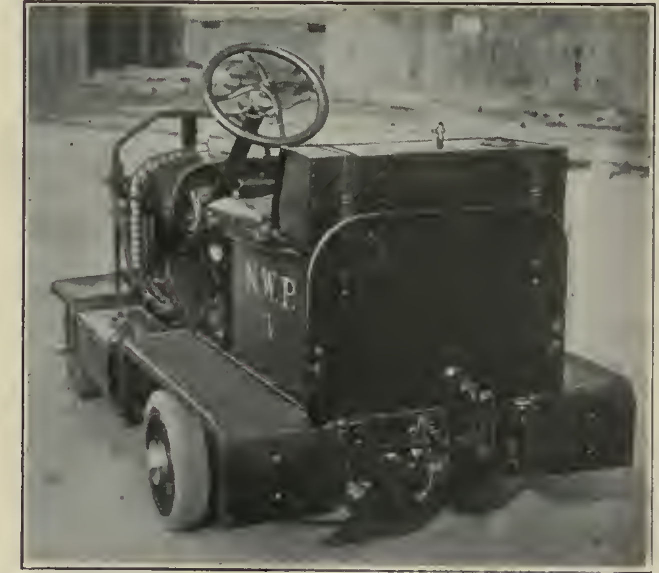
In the manufacture of controller cylinders the milled end for the handle-fit is located by measuring from one of the flat sides of the hexagon or, in the case of the round-shaft type, from the keyway. All other angular distances such as those to segment screw holes and star-wheel notches are located from this milled end. Where a new end for the handle is to be made the operation should be reversed, in the following manner: Take a new cylinder and determine the angular distance from a segment screw hole to one of the milled surfaces and use the distance for locating this surface on a repaired cylinder. Fig. 2 gives the dimensions of the handle end of the main cylinder shaft for the K-10, K-11, K-12, K-27 and K-63 controllers. Fig. 3 gives similar dimensions for the K-6, K-28, K-29, K-35, K-36, K-40, K-51 and K-66 controllers.

Recently several handles have been put on the market that are provided with an adjustment to take up the wear on old controller shafts. At the present time the manufacturers of "K" controllers furnish such a handle with their standard equipments. This particular one is known as a "wedge-lock handle," because the wear is taken up by a wedge forced into place by a spring.

Tractor Made from Rebuilt Ford Expedites Terminal Work

FOR use at the Sausalito terminal of the Northwestern Pacific Railroad in California, Model T. Ford automobiles have been rebuilt into tractors for conveying mail, baggage and express trucks from boats to trains and vice versa. The tractors have now been in operation for about a year and are said to have reduced the time as well as the man power required for the transfer between rail and water. Their operation is reported to be very economical.

The tractors have a tread narrower than the automobile standard, the new axles being made of the same length as those on the baggage trucks. The original rear axles were cut down so as not to project. The new rear axle is set ahead of the original and is driven by chain and sprocket on each end, thus permitting the use of the differential just as arranged for the standard car. The diameter of the front wheels is 14 in. and of the rear wheels 12 in., solid rubber tires being provided throughout. A large water tank was built in under the seat so that the total weight of the machine could be brought up to 1900 lb. This was considered necessary as at low tide considerable traction is required in draw-



TRACTOR FOR BAGGAGE, MAIL AND EXPRESS TRUCKS ing a string of loaded trucks up the inclined apron from the boat. The fuel tank was set on top of the water tank, arranged as a back rest for the operator.

The speedy transfer from boat to train is important at this point because it is the custom for the mail and express to be taken from the front end of the boat before the passengers are permitted to land. This makes possible transfer from the trucks into the trains while the passenger coaches are filling up, and thus trains can pull out quicker than if the trucks were not taken from the boat until the passengers were ashore. Making the passengers wait, however, did not gain popularity for the system, particularly when the baggage trucks had to be pulled up an incline, one at a time, in front of the waiting throng. Since the advent of the tractors the passengers are released much quicker as a tractor backs onto the boat immediately the apron is lowered and all of the trucks are coupled on and taken off in a single trip. The tractors are provided with a very convenient coupling device, as shown in the accompanying view, which automatically locks over the baggage truck handle when the latter is hastily thrust into place. The tractors were built in the shops of the Northwestern Pacific Railroad under the direction of J. K. Brassil, superintendent.

Some Facts About Monel Metal

IN A RECENT issue, London *Engineering* gives some valuable data regarding monel metal, for which many uses are now being found. Readers of the ELECTRIC RAILWAY JOURNAL will remember that one of the earliest electric railway uses was in the resistance strips connecting the armature windings and commutator bars in the single-phase railway motor. According to the *Engineering* article, the ore from which the metal is produced is mined at Sudbury, Canada, and it is called a "natural alloy" in that the proportions of the constituents are about the same in the refined alloy as in the original ore. Roughly, the composition is as follows: Nickel, 66 per cent, copper 29 per cent, manganese and iron, 3½ per cent, silicon from 0.1 to 1½ per cent. Traces of phosphorus, sulphur and aluminum are also present.

The tensile strength of the metal is about 80,000 lb. per square inch and the yield point about 40,000 lb. The strength of the metal is largely "natural" and does not depend much upon the physical treatment. The structure is a solid solution, and the rolled metal shows sharply defined crystal grains, usually twined. The cast material shows only the cord arrangements found in such alloys as German silver. The metal has been largely used on account of the strength which it possesses at high temperature.

According to a report presented to the Dover (England) Tramways Committee recently by Dick, Kerr & Company, the corporation tramways in that city are in bad shape. As a result of failure to provide proper allowance for maintenance the corporation is faced with the alternative of spending a considerable sum of money at a time when materials are very expensive or selling the whole equipment as scrap. In commenting on this situation the *Electrician* notes that the tramways have literally been starved as regards upkeep.

Chipping and Sand Blasting of Glass at Omaha

Cost of Chipping Is Reduced 85 Per cent—Sand Blasting Equipment Made In Shop

THE Omaha & Council Bluffs Street Railway, Omaha, Neb., uses chipped glass quite extensively in the various windows of some of its rolling stock. Like any other glass this is subject to constant breakage, and to replace at the market price would make quite an item of expense, as chipped glass costs about 40 cents per square foot.

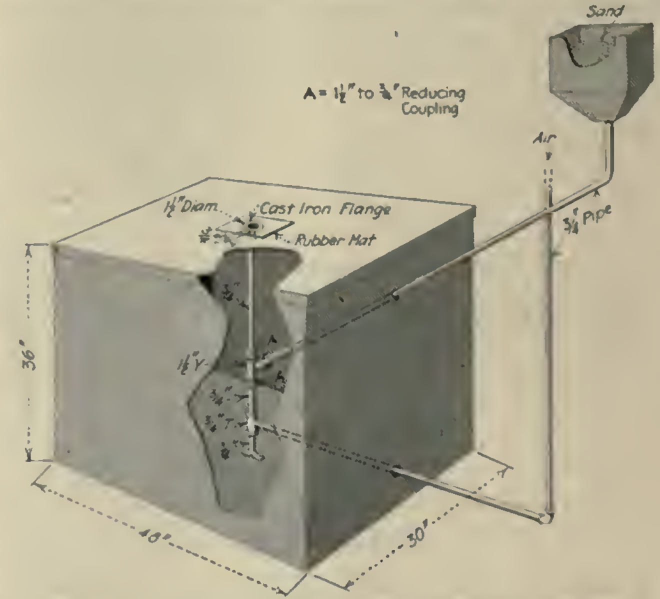


FIG. 1—SAND BLASTING EQUIPMENT MADE IN OMAHA SHOPS

As a matter of economy the company does all of its own glass chipping. The glass is cut entirely from scrap material, and the work is done during the winter months when there are not enough cars in the shop to keep the men busy. A piece of heavy brown paper is pasted around the edge to give a clear edge, and then the glass is covered with a coating of carpenters' glue. When the glue dries the glass chips off with it. This offers a salvage for all scrap glass, and costs about 6 cents a square foot for labor.

Instead of painting signs and instructions on the

FIG. 2—SAMPLES OF GLASS SAND BLASTING AND CHIPPING DONE AT OMAHA

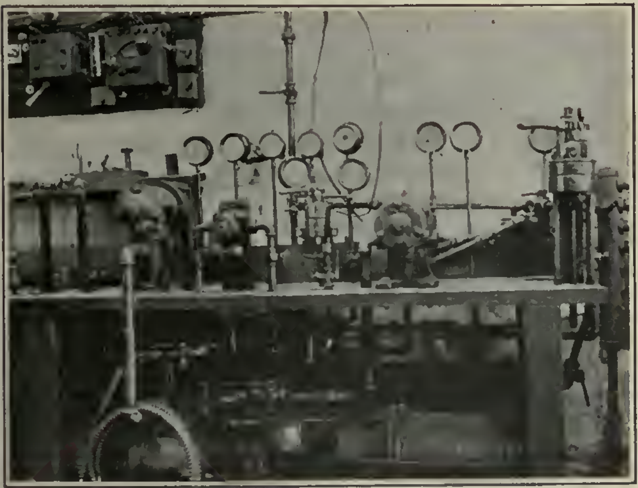
glass car doors and bulkhead windows, to be washed off in cleaning, the Omaha company sand blasts the words into the glass. Many fancy borders are also put on in this way. The lettering is put on by pasting heavy brown paper over the glass, using a templet and pounce bag, and cutting the letters out with a sharp knife. The glass is then ready for the sand blast.

The sand blaster shown in the accompanying sketch, Fig. 1, is a simple piece of equipment made in the railway shops at very slight expense. Sand feeds by gravity from a galvanized iron-box through a ¾-in. pipe into a 1½-in. V. Air entering through a ¾-in. pipe passes through a ¾-in. T to the 1½-in. Y, and forces the sand up through a ¾-in. nozzle pipe. A piece of ¾-in. pipe with the end sealed is screwed into the lower end of the T, and the pipe is split, forming a standard, which is screwed inside the bottom of a box 30 in. x 48 x 3 ft. high. The end of the ¾-in. nozzle pipe is ¾ in. below the lid of the box, and directly over the pipe is a hole 1½ in. in diameter. A square piece of rubber matting on the top of the lid serves as a cushion for the glass, and the edge of the hole is lined with a cast-iron flange.

The Omaha company not only does all of its own work, but also handles some commercial work for outside interests. A sample of both the sand blasting and the chipping is shown in Fig. 2.

Compact Testing Stand for Air-Brake Valves

RAILWAY companies using air brakes, particularly automatic air brakes, find it necessary to provide means for testing triple valves, feed valves, operating valves, etc., and various kinds of testing stands are in use. A compact stand, shown in the accompanying photograph, is used in the Fremont, Ohio, shops of the Lake Shore Electric Railway.



AIR BRAKE VALVE TESTING STAND AT FREMONT, OHIO

In this arrangement the air-brake cylinder and reservoir, with piping, are mounted under the table and the valves are placed at a height convenient for inspection and adjustment above it. Gages are tapped in at points necessary to show the condition of all parts of the equipment when the brake application is made.

LETTER TO THE EDITORS

The "Latest" in Arc Welding

ARC WELDING MACHINE COMPANY, INC.
NEW YORK, N. Y., DEC. 27, 1918.

To the Editors:

We have read your resumé of the report of subcommittee A on welding of the Association of Railway Electrical Engineers. This report undoubtedly represents standard practice of to-day. However, it does not by any means represent the LATEST practice, as the title of your abstract seems to indicate.

Several new developments in arc-welding equipment have been put on the market in the last few years, that are not even mentioned in this report, probably, because they have not come into any extensive use, although one of them has been used extensively in railway jobs.

I refer to the alternating-current welding transformer, the 35-volt generator with automatically regulated resistance in series with the arc, and the constant-current closed-circuit system. All of these systems eliminate the major portion of the power loss, which is the chief objection to the constant-potential system. Two of these systems provide automatic control of the current, and one of them gives voltage limitation. Therefore, no article under the head of "latest practice" would be complete, without including a description of these three systems.

O. A. KENYON, Chief Engineer.

Campaign for Public Works Construction

A GREAT building campaign, involving the construction of highways, public works of other character, homes and public utilities, is about to be undertaken by the government, largely for the purpose of making certain that employment will be found for demobilized soldiers. An organization to conduct the campaign is now being created in Washington, with headquarters at 16 Jackson Place, under the general supervision of Secretary Wilson of the Department of Labor, with the co-operation of the American Federation of Labor and other labor interests. The following slogan for the campaign has been adopted: "Build now for greater and better America. A billion for roads; two billions for public works; three billions for a million new American homes. What are you doing to help this campaign?"

The Department of Labor is sending the following message to wage earners throughout the country: "Use your influence with your city fathers, your selectmen and other town officers to start at once municipal and town improvement." Cities and towns are being urged to build school houses, engine houses, roads, canals and other improvements. To those who believe that the cost of building will be less in a few years from now than it is now, the Department of Labor is replying that "probably 95 per cent of the cost of a residence ultimately goes to labor whenever a home is built, so that the cost is almost immaterial to wage earners as a class." Secretary Baker of the War Department is also cooperating in the campaign, and has asked all the Governors of the States, to urge in their inaugural messages the immediate resumption of building of every character.

Recent Happenings in Great Britain

Reform from Within Speedily Carried Out Is the Plan for Settling Problems Fancied and Real

(From Our Regular Correspondent)

At the time of writing, Great Britain and Ireland face a general election (the first that has taken place for eight years). The Coalition party which will doubtless be returned to power has put forward a program of reform and reconstruction ambitious and far-reaching beyond all precedent. It is a British manifestation by way of ordered development of that new heaven and new earth idea which is a product of a great war and which in some other European countries is producing revolution and in some cases anarchy. There is a widespread feeling that if we are to escape revolution, drastic social and economic changes must be speedily brought about through the agency of the existing government institutions. The bulk of promised benefits is apparently to go to the working classes. All other people are called on to labor, not for their own advantage so much as for that of manual workers.

RAILWAY TRANSFORMATION PROMISED

Transportation is among the subjects in regard to which a transformation is promised. In the tremendous program which the leaders of the coalition have put forward, the subject of development of railways, tramways, road automobile transport and canals is given a prominent place. It has at length been borne in on British statesmen—albeit they admit the fact only tacitly—that the development of means of transport in this country has for years been smothered by legislative and municipal action. This is especially true as regards street tramways and interurban light railways. Expert committees appointed by the government have recently reported on the subject in unmistakable terms.

In the manifesto to the electors of the United Kingdom issued by the Coalition leaders, Lloyd George and Bonar Law, the following passage occurs:

HELP THE AGRICULTURIST

"A systematic improvement in the transport facilities of the agricultural areas must form an essential part of every scheme for the development of the resources of the soil, and the governments are preparing plans with a view to increasing these facilities on a large scale."

And again:

"By the development and control in the best interests of state, and the economical production of power and light of the railways and the means of communication . . . output will be increased, new markets opened out and great economies effected in industrial production."

Lloyd George, who, as the highly successful Prime Minister associated with the winning of the war, speaks with authority in this country, was a little more explicit in an address with which he opened the election campaign. As a collateral subject he spoke of the necessity for the development of a great electric power supply scheme for all purposes, but he insisted on the necessity for improved transportation for the revival of dead rural life and for the development of housing schemes in suburban and rural areas. "You must," he said, "have good services of tramways, light railways, lorries and whatever enables people and goods to pass along great spaces in order to make use of the surface" of the country. "The war has demonstrated that transportation is a service for which the state should accept direct responsibility . . . Unless this happens, the poorer neighborhoods will always suffer."

From all this it is clear that formidable changes lie ahead. The point on which practical men want information is where there is to be state ownership and operation of public utilities, or where there is simply to be state aid and facilities for development along with a certain amount of state co-ordination and control. For the sake of the country itself as well as for the sake of development of the industries concerned, it is to be hoped that the latter will be the alternative. In any event, it is quite clear that a whole host of obstructions to transportation development are likely to be swept away. The municipal as well as the Parliamentary deadhand should be removed. The latest development at the time of writing is a recommendation by a parliamentary committee in favor of unified ownership and management of chief railways either under the state or under a company.

JEALOUSY CROPS OUT

Fresh opportunities continue for the display of jealousy by the English municipal tramway element of all that concerns companies' interests in the matter of tramways. When months ago the Board of Trade appointed a tramways committee to settle priority of claims for materials and to see that under war scarcity conditions all tramways essential for war work should be operated to the fullest extent, the municipal element complained that it was not sufficiently represented on the committee and that the chairman of it was a company, not a municipal, man. An additional municipal representative was then added to the committee, which consists of tramway managers. Fuel has now been added to the old fire by the appointment of A. H. Pott to be visiting technical officer to the committee at a salary of £750 a year. The municipal grievance is that Mr. Pott has been "a company man," having been engineer and manager to the London United Tramways and the Metropolitan Electric Tramways. No doubt exists as to his qualifications for the post. Perhaps the municipal jealousy may be mollified by the reflection that as the war has come to an end the necessity for the existence of the tramways (Board of Trade) committee should disappear.

OTHER CHANGES IN PERSONNEL

The appointment of Mr. Pott is one in a series of linked changes which have recently been made in the management of some of the most important tramway systems in England. The great organization associated under the name of the Underground Electric Railways, London, has from time to time attracted to its service some of the most prominent municipal tramway managers in Britain. The latest transfer of the kind, which took place during the autumn, was that of C. J. Spencer, manager of Bradford Corporation Tramways, and honorary secretary of the Municipal Tramways Association. He entered the service of the London group without any public notification of the post which he was to fill. On the appointment of Mr. Pott to the tramways (Board of Trade) committee, referred to above, it was announced that Mr. Spencer was appointed manager of the Metropolitan Electric Tramways and the London United Tramways, both of which undertakings are controlled by the Underground Electric Railways, London. Mr. Spencer's place at Bradford was filled by the appointment of R. H. Wilkinson, tramway manager and engineer to the Huddersfield Corporation, while now it is announced that A. A. Blackburn, chief engineer and assistant to the manager of the Belfast Corporation Tramways, takes the place of Mr. Wilkinson at Huddersfield.

Some importance to tramway and electric raliway undertakings attaches to a report by the Advisory Council of the Ministry of Reconstruction on the standardization of railway equipment. Among other things, the Council proposes that the standardization of wheels, axles, wheel centers, tires, running gear, draw gear, buffing gear, bogies, brakes and underframes should be dealt with immediately by the engineering standards committee. That committee has done valuable work for a number of years in bringing about standardization in engineering industrial products.

COMMITTEE ON PRODUCTION A MISNOMER

That official body with the misleading name, the committee on production, issued in the end of November an award on a further demand by British tramway employees for increases of wages to meet the still advancing cost of living. Some of the claims are not allowed, but for adult men and also for women who are doing the work of men pay is increased to 30s. per week above pre-war rates. Thus the financial position of many tramway undertakings becomes more and more difficult.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Mopping Up

New York Putting the Finishing Touches to Its $300,000,000 of New Rapid Transit Lines

A review by the Public Service Commission for the First District of New York of the progress made in 1918 of the rapid transit work under the dual system shows that about 75 per cent of the work is finished, and the promise is made that nearly all of the remaining 25 per cent will be ready for the operation of trains before the end of 1919.

City Administration Must Help

Emphasis is laid on the fact that it will not be possible to keep this promise unless there is cordial and prompt co-operation between the commission and the Board of Estimate of the city of New York not only in relation to the work yet to be contracted for, but as to the work now under way and for which appropriations are needed.

There are 341 track-miles in the entire system, and not more than 35 track-miles, or thereabout, will remain uncompleted twelve months hence. Within a few months after New Year's Day in 1920 trains will be operating over the entire stretch of this rapid transit highway, and plans for the extension of the system will be ready for consideration.

These new plans are known to include:

1. The extension of the Queensboro subway from Times Square, its present Manhattan terminus, west to the Hudson River.
2. A subway in Eighth Avenue extending south to the Battery and north to the northern edge of the Bronx.
3. The extension of the Broadway subway from Fifty-ninth Street, where it will turn east and go to Queens via tunnel at the foot of Sixtieth Street, direct north under Eighth Avenue to the Bronx.
4. A moving platform from Times Square to the Grand Central Station instead of the present shuttle, with exits and entrances at all intersections.

Few Unawarded Contracts

The contracts still to be let for the completion of the dual system provide for the construction of the elevated part of the Fourteenth Street-Eastern line in Williamsburg, the extension of the steel work on Westchester Avenue east of the Bronx River on the Pelham Bay Park line, the extension of the Queensboro subway from Park Avenue to Times Square, and for the Nassau Street subway connecting the Centre Street loop in the Municipal Building with the Whitehall Street-Montague tunnel to Brooklyn.

These contracts will be ready to let early in 1919 as well as other contracts for track installation, station finish and the odds and ends to make the work complete. Other important work to be done will be the acquisition of real estate for storage yards for the Pelham Bay Park line, the Corona Elevated line and the Livonia Avenue branch of the Eastern Parkway line in Brooklyn. The time of trouble in getting steel to carry on the work is past, the commission believes, and the hope is expressed that from now until the end there will be plenty of men and material and plenty of money, too, if the Board of Estimate will lend a helping hand.

Contracts already made by the commission for the city-owned lines of the dual system aggregate approximately $208,000,000. The operating companies, exclusive of real estate, have spent about $102,000,000 for equipping these and company-owned lines.

Arbitrators Will Fix Wreck Costs

Whether the Brooklyn (N. Y.) Rapid Transit Company shall charge to operating expenses the costs growing out of the Malbone Street tunnel accident on Nov. 1 is to be decided by a board of arbitration consisting of Louis Marshall of the law firm of Guggenheimer, Untermyer & Marshall, who was named by the Public Service Commission, ex-Secretary of War Lindley M. Garrison of the law firm of Hornblower, Garrison, Miller & Potter, who was chosen by the company, and ex-Justice Charles E. Hughes, who was named by Chief Judge Frank H. Hiscock of the Court of Appeals, because the company and the commission could not agree upon the third member.

Under the dual contracts between the company and the city the latter is entitled to a share of the receipts after operating expenses are met. If all the expenses of the accident were charged against operating expenses the result would be that the city would be paying at least half of the costs of the accident. It was also provided in the contract that any disagreement concerning charges should be determined by arbitration.

The commission has notified the members of the Board of Estimate that arbitration proceedings are under way, so that care can be taken to keep any expenditures due to the accident out of the accounts showing the city's interest on investment or its share in receipts.

Labor Reports

Supply and Demand Seem to Be Pretty Well Equalized in Most of the Country

The statement as to labor conditions throughout the country made up from the weekly reports obtained by the Department of Labor by telegraph from local representatives of the United States Employment Service shows that in Portland, Me., the indications are that supply and demand are equal. In Boston, Lynn and Worcester, Mass., there have been slight decreases from firms reporting, caused by the laying off of men. The rest of the State shows supply and demand equal. Reports from Providence indicate a reduction in employees, with supply and demand equal. Connecticut, according to reports received, is the only state in New England that shows any marked surplus.

In New York Buffalo appears to be the only city in the State reporting a large surplus.

In New Jersey a shortage is indicated by most of the cities reporting, with a marked reduction in Newark.

No surpluses are indicated in Pennsylvania. Throughout that State the principal shortages indicated are found among electricians, laborers, machinists, railroad workers and blacksmiths.

Heavy unemployment is indicated in reports from Cleveland and Dayton.

In Illinois supply and demand are now reported to be about equal. Especially is this true of Chicago. Throughout the State there appear to be shortages in labor, railroad workers, and agriculture. Detroit, Mich., reports a large surplus, probably caused by holiday lay-offs and inventory. A small laying-off of men in Minneapolis and St. Paul is reported. Reports from Duluth indicate a slight increase.

Atlanta, Baltimore, Norfolk continue to show shortages. Shortages in Georgia are indicated in carpenters, laborers and textile workers, with a heavy shortage in Maryland of coal miners and laborers. Nashville reports a surplus of 2000. In New Orleans supply and demand are about equal.

Salt Lake City still indicates a surplus, though slight, with a shortage from Little Rock. Kansas City reports a slight lay-off, St. Louis a slightly increased lay-off.

San Francisco indicates a surplus of 7500 as against 7000 in a previous report. The Oakland surplus is still given as 2500. In Los Angeles supply still equals demand. There is a shortage in Seattle, but supply and demand are about equal in Portland, Ore.

Revenue Bill Provisions

Some Provisions of Measure Regarded as Working Further Hardship on Public Utility Companies

The revenue bill has passed the Senate and is now before the conference committees of Congress. Two sections of the bill are of particular importance to public utility companies.

One of these is Section 240. It deals with the consolidated returns of public utility companies, and was amended by the Senate. The Washington representative of the Electric Railway Journal reports that public utility men who have recently visited Washington from various sections of the country hope that the Senate amendment in respect to consolidated returns will be acquiesced in by the House conferees. These representatives of the utilities express the opinion that the Senate amendment gives an apparent equity and convenience to holding companies whose properties are widely scattered and are operated under varying conditions of public regulation.

Bill Unduly Burdensome

The other section of the bill of interest to public utilities is that embodied in Senate Amendment 488. Public utility men recently in Washington in this instance, however, regard this amendment as imposing an undue burden upon public utility companies for the reason that during the war a great shrinkage occurred in the real value of public utility stocks. As the bill was passed by the Senate, the basis of computing for capital stock tax was made "the net assets shown by the books," instead of "the fair average value of the capital stock for the preceding year." In connection with this measure representatives of the utilities point out that during and since the war, in connection with the great shrinkage in the real value of their stock, dividends have been suspended in order that funds might be made available for the carrying out of the numerous requirements for extensions and betterments of service as demanded by public authorities and by the government's needs in the prosecution of the war.

It is stated, therefore, that the book assets of the companies do not represent an equitable measure of taxable value and that the use of such a basis would constitute a gross injustice to the industry, which has been burdened more than any other during the war because of its inability automatically to increase its rates sufficiently to absorb the enormous advances in the cost of materials, fuel and labor, all of which have been adjusted upwards through agencies of the federal government.

It is regarded as of the utmost importance that the section as changed by Senate Amendment 488 should not be approved by the House conferees and that the former basis of computing the tax from "the fair average value of the capital stock for the preceding year," should be reinstated.

The language of the two sections of the bill in question is as follows:

CONSOLIDATED RETURNS,
SECTION 240

(a) That corporations which are affiliated within the meaning of this section shall, under regulations to be prescribed by the Commissioner with the approval of the Secretary, make a consolidated return of net income and invested capital for the purposes of this title and Title III, and the taxes thereunder shall be computed and determined upon the basis of such return.

In any case in which a tax is assessed upon the basis of a consolidated return the total tax shall be computed in the first instance as a unit and shall then be assessed upon the respective affiliated corporations in such proportions as may be agreed upon among them, or, in the absence of any such agreement, then the basis of the net income and invested capital properly assignable to each. There shall be allowed in computing the income tax only one specific credit of $2,000 (as provided in section 311) only one specific exemption of $3,000; and in computing the excess profits credit (as provided in section 312) only one specific exemption of $3,000.

(b) For the purpose of this section, two or more corporations engaged in the same or related business shall be deemed to be affiliated—

(1) If one corporation owns directly or controls through closely affiliated interests or by a nominee or nominees substantially all the stock of two or more corporations is owned or controlled by the same interests, or if one such corporation buys from or sells to another products or services at prices above or below the current market, thus effecting an artificial distribution of profits, or in any way so arranges its financial relationships with another corporation as to assign to it a disproportionate share of net income or invested capital.

(2) A foreign corporation shall not be deemed to be affiliated with a domestic corporation unless a majority of the voting stock is owned or controlled by such domestic corporation or a resident taxpayer or group of resident taxpayers or by such domestic corporation and a resident taxpayer or group of resident taxpayers closely affiliated with the management of said domestic corporation. Where under this subdivision a foreign corporation is affiliated with a domestic corporation, the total tax (computed as a unit as above provided) shall be reduced by the credit authorized in section 238.

TITLE X.—SPECIAL TAXES.
SECTION 1000

(a) That on and after July 1, 1918, in lieu of the tax imposed by the first subdivision of section 407 of the Revenue Act of 1916:

(1) Every domestic corporation shall pay annually a special excise tax with respect to carrying on or doing business, equivalent to $1 for each $1,000 of the excess over $5,000 of the amount of its net assets shown by its books as of the close of the preceding annual period used by the corporation for purposes of making its income tax return; but if the corporation made no such return, then of the excess over $5,000 of the amount of its net assets shown by its books as of the 30th day of June preceding. • • •

War Board Challenged

The National War Labor Board on Dec. 30 began an inquiry into hours and conditions of labor on the Third Avenue Railway, New York.

On behalf of the employees, application was made to the board for a recommendation that employees alleged to have been discharged during the present year for belonging to a union should be reinstated and paid for the interval during which they were without employment. The board was also asked to rule that the company, which has employed women in recent months, should take back into its employ all men employees who wish to go back into the service. Higher wages and shorter hours were also asked for.

The company was not represented by counsel at the hearing, but a memorandum was submitted on its behalf, denying the authority of the War Labor Board, as follows:

> Neither the federal government nor any federal agency has power or authority to regulate, interfere with, or in any way control the operation of a street surface railway located wholly within a state. The decisions of your board relative to labor employed by such a street surface railway must necessarily affect the operating expenses of such railway, and yet the power to increase or regulate the rates of fare of such railway is vested only in the state.
>
> Any federal legislation, act, or proclamation purporting to give to your board power to pass upon, or control in any way, matters relative to labor employed by a street surface railway, or otherwise to regulate the expenditure and operation of a street surface railway, is confiscatory and unconstitutional, in that neither the federal government nor any federal agency has the power to afford to such street railway corporation any necessary increase in rates or revenues to enable it to carry out any decision of the War Labor Board requiring, or which may result in, additional or increased expenditures by such street surface railway.

Improving Short Line

Eighteen-Mile Massachusetts Road Being Completely Equipped for Trolley Operation

Plans for further development of the Grafton & Upton Railroad are under way. The company operates a standard-gage railroad about 18 miles long, running from Milford, Mass., through Hopedale, Upton, West Upton and New England Village to North Grafton, where it connects with the main line of the Boston & Albany Railroad about 6 miles east of Worcester.

The passenger service on this road has been operated by the Milford & Uxbridge Street Railway for about sixteen years, the street railway cars using the railroad track between centers of towns, with detours into the streets and village centers at each place above named.

The railroad right-of-way is now being completely equipped with overhead trolley construction (in addition to the sections hitherto used by the Milford & Uxbridge cars) and the company has purchased two 30-ton General Electric locomotives for handling freight over the line at night. One additional electric locomotive may be purchased later if the traffic conditions warrant. Two steam locomotives are owned by the road.

The electric freight service has not yet been started, but the indications are that this will be done during the present winter, or in the early spring at the latest. H. A. Billings, the Draper Company, Hopedale, Mass., is in charge of the operation of the Grafton & Upton line. At North Grafton there is a crossing of the Worcester Consolidated Street Railway. Power is purchased from the Milford & Uxbridge Street Railway.

New York Commissioners Resign

Charles Bulkley Hubbell, chairman, and Samuel H. Ordway, resigned on Dec. 31 as members of the Public Service Commission for the First District of New York. Mr. Hubbell addressed his resignation to Governor Whitman, while Commissioner Ordway wrote to Governor-elect Alfred E. Smith. The term of office for which Chairman Hubbell was appointed would have expired on Feb. 1, 1919, and that of Commissioner Ordway on Jan. 20.

In his letter of resignation Mr. Hubbell recalled Mr. Smith's declarations regarding the reorganization of the Public Service Commission, and said that he wished to resign so as to give the Governor-elect a free hand immediately after he takes office.

Commissioner Ordway explained in his letter to Mr. Smith that he had not sought the office of Public Service Commissioner and had accepted it with reluctance. His appointment was made during a recess of the Senate and has never been confirmed.

News Notes

War Labor Board to Visit Cincinnati.—On Jan. 6 examiners of the War Labor Board will visit Cincinnati to inquire into the scale of wages paid to employees of the Cincinnati Traction Company, other than platform men. The schedule provides for a minimum wage of 42½ cents an hour.

Wage Increase in Youngstown.—The Mahoning & Shenango Railway & Light Company granted the men a substantial increase in wages. A new agreement has also been signed. The men will be advanced from 34 cents to 48 cents an hour. More than 500 men are affected.

New Member Iowa Conciliation Board.—C. F. Harrington, Sioux City, Iowa, banker, has been named to the vacant place on the Iowa Conciliation Board. His selection was agreed upon by the Iowa League of Municipalities and the public utilities organization. Mr. Harrington takes the place of J. H. Ingwerson, who has moved from the State.

Ottumwa Strike Settled.—The strike of employees of the Ottumwa Railway & Light Company, Ottumwa, Iowa, was only of forty-eight hours' duration and was ended by the members of the City Council agreeing to grant the 6-cent fare which was asked by the company in order to increase the wages of the employees. The fare increase is for the period until peace is declared.

I. C. C. Rate Authority to Stand.—Authority of the Interstate Commerce Commission will stand regardless of federal control of the railroads. In a far-reaching decision, the commission has made clear its authority to act, and also determine the status of all cases now before it as well as the validity of decisions rendered before the government took control of the roads.

Hearing on Women Again Changed.—The hearing involving the employment of women on the lines of the Detroit (Mich.) United Railway set for Chicago on Jan. 4 instead of at Washington has again been changed by the War Labor Board and it is understood that the Chicago date has been cancelled and that the hearing will probably be in Washington at a date yet to be determined.

Receiver Satisfies Pittsburgh Men.—Charles A. Fagan, receiver for the Pittsburgh (Pa.) Railways, on Dec. 18 following a conference with union officials, ordered the reinstatement of a carman discharged for refusing to take out an unheated car, and announced that within five days heaters would be installed in the vestibules of all the cars, as provided for in the agreement between the receivers and the employees.

Toronto Fine Sustained.—The judgment of the Ontario Railway & Municipal Board, imposing a fine of $24,000 on the Toronto (Ont.) Railway, as a penalty, at the rate of $1,000 a day, for delay in putting 100 new cars into service, has been confirmed by the Provincial Appellate Court. The company disputed the authority of the Ontario Railway & Municipal Board to impose such a fine. The board was sustained.

Association of Oklahoma Operators.—The Oklahoma Utilities Corporation is the official designation of the union of all public utilities in Oklahoma, including city electric railways, interurban companies, etc. The purpose is to bring into closer touch and co-operation the managers of all such companies and to make for uniform service and regulations throughout the State. Headquarters will be maintained in Oklahoma City.

Labor Department Organizes New Divisions.—Secretary W. B. Wilson of the Labor Department announces the establishment of three new divisions as follows: Division of industrial hygiene and medicine, to develop standards of sanitation and medical practice in industries; division of labor administration, to advise employers as to employment systems and labor management policies; and division of safety engineering, to develop standards and practices for accident prevention.

Wants to Void Occupation Tax.—The Omaha & Council Bluffs Street Railway, Omaha, Neb., has asked the District Court to declare void the occupation tax, under which it pays the city of Omaha between $75,000 and $100,000 a year. The petition was filed in connection with a motion to vacate an injunction obtained by the city against the company in which Mayor Smith sought to have the courts order the company to restore service while the recent strike was in effect.

More Politics.—As a result of the blow aimed at the Public Service Commission for the First District of New York by the Board of Estimate on Dec. 30 almost the entire inspectional force on subway construction had to be cut off. Other employees vital to the pushing of the new subways had to be released. It is probable that the Legislature will be asked to appoint a special committee to investigate the way in which the work of the commission has been hampered.

Up to the Incoming Council.—The City Council of London, Ont., at its final meeting of 1918, rejected a resolution to cancel the franchise, of the London Street Railway and eject it from the streets. It was alleged that the company had refused to comply with the city's time and speed requirements, and that it had defied the Council's order for the collection of a fine of $10 a day for delay. The outgoing Council, however, indorsed the spirit of the resolution and recommended that action be taken at the first meeting of the Council of 1919.

Council Opposes New Depot Ordinance.—A resolution was adopted on Dec. 23 by the City Council of Cleveland, Ohio, opposing the proposed union depot ordinance, initiated by the officers of the Cleveland Union Terminals Company, to be voted upon at an election on Jan. 6. The resolution is intended as a recommendation to voters to defeat the ordinance, in the belief that the company will then propose another grant that will be more satisfactory to the Council and the engineers and organizations which have criticised the proposal.

Co-operative Store Idea Abandoned.—Groceries and canned goods of the New York (N. Y.) Railways valued at $150,000, are being offered at auction. The sale marks the last step in the dissolution of the chain of co-operative stores which the Interborough and the New York Railways Company established to lower the cost of living for their employees. The stores were given up by the companies for lack of patronage on the part of the employees, for whose exclusive use they were opened several years ago. The salaries of grocery clerks and butchers and the upkeep of the stores were paid by the companies so that the goods could be sold strictly at cost without figuring in overhead expenses.

Program of Meeting

Illinois Electric Railway Association

The annual meeting of the Illinois Electric Railway Association will be held in Chicago on Jan. 17. It is expected that P. H. Gadsden, chairman of the committee on readjustment of the American Electric Railway Association, will address the association.

Financial and Corporate

B. R. T. in Receiver's Hands

Lindley M. Garrison Called Upon by Court to Administer Affairs of Sorely Beset Railway

Judge Julius M. Mayer of the United States District Court at New York, after the close of business on Dec. 31, made an order appointing Ex-Secretary of War Lindley M. Garrison temporary receiver of the Brooklyn Rapid Transit Railroad Company, the New York Municipal Railroad Corporation, and the New York Consolidated Railroad Corporation, these two being subsidiaries of the Brooklyn Rapid Transit Company. The order was made upon the application of the Westinghouse Electric & Manufacturing Company, a creditor, for material furnished. The companies did not oppose the action, for they felt that they would be subserved by a temporary receivership.

MANY MILLIONS NEEDED

The immediate requirements were for meeting on Jan. 1 obligations for about $2,000,000, and this could have been obtained, but to complete the construction and equipment work now under contract and to provide for additional expenditures for similar purposes during the coming year will require the raising of many millions more, and the general situation affecting street railroads, with their stationary fares and rising costs, had injured their credit and made impossible up to the present time provision for the investment of fresh capital.

Col. Timothy S. Williams, president of the Brooklyn Rapid Transit Company, made a statement in which he said in part:

"Every possible effort to provide for these construction and equipment needs, including informal applications to the War Finance Corporation, had been taken by the directors, but without substantial results, and it seems wise to face the issue now with the hope that general knowledge and appreciation of the necessities would suggest a way for their solution.

COMPANY HANDICAPPED BY CITY

"The company has been greatly handicapped by the delay of the city in completing its subways. These should have been mostly in operation two years ago.

"The essential parts of them are still under construction. In the meantime a large part of our $60,000,000 investment is unproductive, and existing and completed parts of the system cannot be effectively or profitably operated.

"In addition to this handicap the high cost of labor and materials and the other hardships, caused by the war, have largely reduced the net earnings. The effort on the part of the company to restore rates of fare authorized by their franchises or to get the right to charge fares sufficient to meet the cost of service, has thus far failed.

"It is greatly to the advantage of the property that the court has appointed as receiver a man of executive and of administrative ability, ex-Secretary of War Garrison."

Mr. Garrison, the receiver, was in Washington on Jan. 1 but he denied his visit was for the purpose of seeking further government aid.

W. F. C. ADVANCED $17,320,500

On June 20 last the directors of the War Finance Corporation decided, upon certain conditions, to make a direct advance of not exceeding $17,320,500 to the Brooklyn Rapid Transit Company for the purpose of enabling the company in part to meet the $57,735,000 face amount of its six-year 5 per cent secured gold notes, maturing on July 1, 1918. For this advance the War Finance Corporation was to receive new three-year 7 per cent secured gold notes of the Brooklyn Rapid Transit Company at par. The War Finance Corporation at that time was willing, on the consummation of the plan then presented for the extension of the maturing notes of the Brooklyn Rapid Transit Company, to make advances in proper cases to banks, bankers, and trust companies, as provided in Section 7 of the War Finance Corporation act, upon the new three-year 7 per cent secured gold notes of the company.

WANTS CITY REPRESENTATION

Corporation Counsel William P. Burr after reading certain comments on the matter said the situation was too complicated for observations that were only intended to be smart. It was Mr. Burr's judgment that it would be to the advantage of all concerned that the city have representation in the management of the affairs of the company by the appointment of a co-receiver to be named by the city and appointed by the court.

The security holders were quick to organize. A committee headed by Albert H. Wiggin is calling for deposit of stock. The Central Union Trust Company, Kuhn, Loeb & Company and Kidder, Peabody & Company are asking for the deposit of the three-year 7 per cent secured gold notes and the six-year 5 per cent secured gold notes of the Brooklyn Rapid Transit Company and the first mortgage 5 per cent sinking fund gold bonds, series A, due on Jan. 1, 1966, of the New York Municipal Railway Corporation.

New Angles at Columbus

Stockholders' Protective Committee Confers with Management About Settlement of Problems

The stockholders' protective committee of the Columbus Railway, Power & Light Company, Columbus, Ohio, conferred with Norman McD. Crawford, vice-president, on Dec. 27 relative to certain demands which have been made by the members. Chairman Emil Keiswetter afterward stated that conferences so far held had not resulted in much progress. It is said that the committee will insist that the control and responsibility of operation be localized. The committee asks to be represented at the annual meeting on Jan. 28 by three out of the five members of the proxy committee.

Clarence M. Clark, vice-president of the company, conferred with the committee on Dec. 23 and 24. At that time both Mr. Clark and the committee felt that progress had been made toward an understanding. Mr. Clark expressed the belief, however, that the organization of a stockholders' protective committee was ill-advised.

CONCLUSIONS OF REPORT CRITICISED

Both Mr. Clark and Mr. Crawford criticised the conclusions and estimates that E. W. Bemis has drawn from the figures presented in his report. No one, they said, could make an estimate of what the results would have been during September and October, 1918, had the old rate of fare been used. The figures given in the report, they say, bear out the company's claim as to losing money. Mr. Crawford said that, on June 30, before the change in fare had been made, the railway department had $241,584 with which to meet interest charges and depreciation on its proportion of the company's investment, after paying all operating expenses and taxes. The interest charges alone would have been about $210,000, he said, leaving $31,000 to meet depreciation charges of about $333,000. The railway department, therefore, fell short more than $300,000 in six months.

On Dec. 24, an owner of ten shares of stock filed a petition in Common Pleas Court in which the appointment of a receiver was asked. The petition alleged that the repudiation of the old rate of fare of eight tickets for a quarter had damaged the company's securities.

SUIT NOT SERIOUS

H. W. Clapp, general manager of the company, said on Dec. 30 that this suit was brought by an attorney, representing a number of small stockholders, in order to fix their status in the matter. It did not represent an action by minority stockholders, and there was nothing serious about it. The court, he said, is not likely to take any action on it soon, if at all.

On the same day C. M. Clark, representing the Clark Management Company, and the stockholders' protective committee held another conference.

Fare Increases Show Results

Forty-Three Per Cent of Companies Reporting for September Have Raised Their Rates

The tables just made public by the information bureau of the American Electric Railway Association show the revenues and expenses of electric railways operating over 5000 miles in the United States, for the nine months ending Sept. 30, 1918, as compared with the nine months ending Sept. 30, 1917, and for the month of September, 1918, as compared to September, 1917.

The latter table is particularly interesting as reflecting in some measure the effect of fare increases granted throughout the country. Of the roads, whose statistics are included in this table, nearly 43 per cent have increased their fares since September, 1917. The result is shown in the lowest percentage decrease in net earnings recorded since August, 1917. Fifty-one per cent of the roads reporting in the Eastern District have received increases, and 33 per cent, in both the Southern and Western Districts.

The result is reflected in the figures, the Eastern district showing an actual percentage gain in net earnings, as against a loss in both of the other districts. That the situation is by no means taken care of by the increases already granted, however, is indicated from the operating ratio for the month which is 68.08 per cent for 1918, as against 64 per cent for 1917.

The operating ratio as shown in the table covering nine months operation, is also discouraging, being 67.20 for 1918 as against 63.32 for 1917, an increase of nearly 4 per cent. The operating ratio for the first nine months of 1916 was 60.96 per cent, so that in two years there has been an actual increase of nearly 7 per cent.

A drop in net earnings of 4.26 per cent for the nine months period is shown, with the Western companies showing the largest loss, 8.36 per cent; the Eastern companies 3.10 per cent and the Southern companies 2.59 per cent. The Western showing is further aggravated by the fact that a strike lasting during the first six months of 1917 took place on one of the largest Western properties, and kept earnings down and expenses up during that period.

That there is nearly twice the percentage increase in operating expenses as compared to operating revenues is the outstanding fact of the table for the nine-month period. This holds true in all districts and both with com-

COMPARISON OF REVENUES AND EXPENSES OF ELECTRIC RAILWAYS SEPTEMBER, 1918 AND 1917

Account	United States				Eastern District				Southern District				Western District			
		Per Mile of Line				Per Mile of Line				Per Mile of Line				Per Mile of Line		
	Amount, September 1918	1918	1917	% Increase Over 1917	Amount, September 1918	1918	1917	% Increase Over 1917	Amount, September 1918	1918	1917	% Increase Over 1917	Amount, September 1918	1918	1917	% Increase Over 1917
Operating revenues	$11,786,768	$2,234	$2,003	11.53	$7,944,601	$2,298	$2,038	12.76	$1,238,860	$1,760	$1,623	8.81	$2,603,307	$2,332	$2,117	10.16
Operating expenses	8,024,487	1,521	1,282	18.64	5,382,908	1,557	1,318	18.13	819,929	1,169	934	25.16	1,821,650	1,632	1,376	18.60
Net earnings	3,762,281	713	721	†*1.11*	2,561,698	741	720	2.92	418,931	597	689	†*13.35*	781,657	700	741	†*5.58*
Operating ratio, per cent	1918, 68.08; 1917, 64.00				1918, 67.75; 1917, 64.67				1918, 66.19; 1917, 57.55				1918, 69.98; 1917, 65.00			
Av. No. miles of line	1918, 5,275; 1917, 5,192				1918, 3,458; 1917, 3,446				1918, 701; 1917, 648				1918, 1,116; 1917, 1,098			
COMPANIES REPORTING TAXES																
Operating revenues	$7,726,357	$2,204	$1,964	12.22	$4,673,232	$2,102	$1,868	12.53	$481,793	$2,185	$1,828	19.53	$2,571,332	$2,422	$2,196	10.29
Operating expenses	5,467,565	1,560	1,318	18.37	3,360,161	1,512	1,299	16.40	311,684	1,414	1,011	39.86	1,795,720	1,692	1,424	18.82
Net earnings	2,258,792	644	646	†*0.31*	1,313,071	590	5.69	3.69	170,109	771	817	†*5.63*	775,612	730	772	†*5.44*
Taxes	431,345	123	124	†*0.81*	244,493	110	113	†*2.65*	38,286	174	154	12.99	148,563	140	140	.....
Operating income	1,827,447	521	522	†*0.19*	1,068,575	480	456	5.26	131,823	597	663	†*9.95*	627,649	590	632	†*6.65*
Operating ratio, per cent	1918, 70.78; 1917, 67.11				1918, 71.93; 1917, 69.54				1918, 64.71; 1917, 55.31				1918, 69.86; 1917, 64.85			
Av. No. miles of line	1918, 3,505; 1917, 3,473				1918, 2,223; 1917, 2,212				1918, 221; 1917, 217				1918, 1,061; 1917, 1,044			

†Indicates decrease.

COMPARISON OF REVENUES AND EXPENSES OF ELECTRIC RAILWAYS FOR NINE MONTHS, JANUARY-SEPTEMBER, 1918 AND 1917

Account	United States				Eastern District				Southern District				Western District			
		Per Mile of Line				Per Mile of Line				Per Mile of Line				Per Mile of Line		
	Amount, January-September, 1918	1918	1917	% Increase Over 1917	Amount, January-September, 1918	1918	1917	% Increase Over 1917	Amount, January-September, 1918	1918	1917	% Increase Over 1917	Amount, January-September, 1918	1918	1917	% Increase Over 1917
Operating revenues	$97,697,830	$18,844	$17,600	7.07	$65,816,918	$19,547	$18,291	6.87	$10,018,751	$14,286	$13,153	8.61	$21,862,161	$19,586	$18,113	8.13
Operating expenses	65,657,286	12,664	11,145	13.63	43,893,296	13,036	11,572	12.65	6,226,296	8,878	7,601	16.80	15,537,694	13,920	11,930	16.68
Net earnings	32,040,544	6,180	6,455	†*4.26*	21,923,622	6,511	6,719	†*3.10*	3,792,455	5,408	5,552	†*2.59*	6,324,467	5,666	6,183	†*8.36*
Operating ratio, per cent	1918, 67.20; 1917, 63.32				1918, 66.69; 1917, 63.27				1918, 62.14; 1917, 57.79				1918, 71.07; 1917, 65.86			
Av. No. miles of line.	1918, 5,184; 1917, 5,101				1918, 3,367; 1917, 3,355				1918, 701; 1917, 648				1918, 1,116; 1917, 1,098			
COMPANIES REPORTING TAXES																
Operating revenues	$63,374,872	$18,560	$17,264	7.51	$38,025,382	$17,831	$16,761	6.38	$3,745,507	$16,986	$14,742	15.22	$21,603,983	$20,352	$18,810	8.20
Operating expenses	45,556,188	13,342	11,613	14.89	27,962,833	13,112	11,598	13.05	2,286,466	10,369	8,169	26.93	15,306,889	14,420	12,357	16.69
Net earnings	17,818,684	5,218	5,651	†*7.66*	10,062,549	4,719	5,163	†*8.60*	1,459,041	6,617	6,573	0.67	6,297,094	5,932	6,453	†*8.07*
Taxes	4,447,243	1,302	1,181	10.25	2,626,056	1,231	1,148	7.23	308,880	1,401	1,318	6.30	1,512,307	1,425	1,220	16.80
Operating income	13,371,441	3,916	4,470	†*12.39*	7,436,493	3,488	4,015	†*13.13*	1,150,161	5,216	5,255	†*0.74*	4,784,787	4,507	5,233	†*13.87*
Operating ratio, per cent	1918, 71.89; 1917, 67.27				1918, 73.53; 1917, 69.20				1918, 61.04; 1917, 55.41				1918, 70.85; 1917, 65.69			
Av. No. miles of line	1918, 3,415; 1917, 3,383				1918, 2,133; 1917, 2,122				1918, 220; 1917, 217				1918, 1,062; 1917, 1,044			

† Indicates decrease.

panies reporting taxes and those which do not. It is modified somewhat in the September tables, where fare increases have evidently helped out the revenues of the companies.

The returns from the city and interurban electric railway companies, as shown in detail in the tables on page 69. have been classified according to the following geographical grouping: Eastern District—East of the Mississippi River and north of the Ohio River. Southern District—South of the Ohio River and east of the Mississi River. Western District—West of the Mississippi River.

$116,785,500 in Maturities

Nearly Half Grand Total of $261,887,600 Utility Maturities in 1919 Fall to Electric Railways

Public utility securities maturing during 1919 aggregate $261,887,600, compared with $210,500,000 in 1918, according to the *Wall Street Journal.* Owing to conditions arising from the war public utility companies found it difficult during the last three years to sell long-term bonds at normal rates of interest, so that the short-term method was employed in many cases to tide over the tight money market. Since the armistice was signed, however, market conditions have improved considerably. Therefore, in the coming year, according to the *Journal*, there should be a gradual shift from the practice of short-term financing to the long-term bond method. Below is given in detail, as compiled by Dow, Jones & Company. the various electric railway issues of more than $200,000 maturing in 1919, in order of their due dates.

January

East St. Louis & Sub. Co. conv.	6	$2,094,000
Interboro Cons. bank loan	5	700,000
Chattanooga Elec. Ry. 1st	5	625,000
Pensacola Elec. 3-yr. notes	6	500,000
Knoxville Ry. & Lt. 2-yr. notes	6	400,000
Seashore Elec. Ry. 1st ext	6	200,000
General Gas & Elec. notes	6	200,000
Winnipeg Elec. 2-yr. notes	6	750,000
Twin State Gas & El. 1-yr. nts.	6	300,000
Total		$5,769,000

February

American Rys. Co. 3-yr. notes	5	1,672,000
Eighth Ave. R.R. ctfs. of debt	6	750,000
Connecticut Co. provis'l deb.	5	250,000
Zanesville Electric Ry. 1st	4	250,000
Washington Water Pow. notes	6	2,600,000
Total		$5,522,000

March

Public Serv. of N. J. 3-yr. notes	5	$7,500,000
Union Ry. Gas & El. 5-yr. notes	5	3,000,000
Fort Wayne & N. Ind. tr. notes	6	1,164,000
Jacksonville Trac'n 2-yr. notes	6	750,000
Am. Public Service cv. notes	6	500,000
Total		$12,914,000

April

Montreal Tram & P. 2-yr. notes	6	$5,350,000
Union Ry. Gas & E. 3-yr. notes	5	3,000,000
Denver Tramway 5-yr. cv.	6	2,500,000
Denver City Tramway 1st	5	2,000,000
Birmingham Ry. Lt. & P. notes	6	1,312,000
Total		$14,162,000

May

West Va. Trac. & El. 2-yr. notes	6	1,800,000
United Traction Co. deb.	4½	456,000
Watervliet Turnpike & R R. 1st	6	550,000
Marion City Ry. 1st ext	6	328,000
Madison Rys. 5-yr notes	6	200,000
Total		$3,134,000

June

Michigan Ry. 5-yr. notes	6	$6,500,000
N. Orleans Ry. & Lt. 1-yr. notes	7	4,000,000
Grand Rapids Ry. 1st	5	3,500,000
Elgin, Aurora & So. Tr. 1st ext	5	2,000,000
Ind., Newcastle & East Tr. 1st	6	1,200,000
New Orleans Ry. & Lt. 1-yr.	7	1,000,000
Miscellaneous		544,500
Total		$18,744,500

July

Chicago Elev. Rys. notes ext.	5	$13,601,000
American Cities Co coll tr	5–6	7,500,000
Piedmont & No. Ry. 5-yr. notes	5	6,286,000
Union Traction of Indiana gen.	5	4,611,000
Northern Ohio Traction cons.	5	2,995,000
Sioux City Traction 1st	5	750,000
Cin., Lawrenceburg & A. St. Ry.	5	750,000
Arkans. Valley Ry., L. & P. nts.	6	450,000
Chi., No. Shore & Mil. notes	6	345,000
Total		$37,288,000

August

Reading Trans. & Lt. 2-yr. nts.	6	$2,450,000
West End Street Ry. deb.	5	1,581,000
So. Shore & Boston St. Ry. 1st	5	335,000
Riverside & Arlington Ry. 1st	4	200,000
Iowa Ry. & Light 2-yr. notes	6	700,000
Total		$5,266,000

September

Am. Pub. Utilities Co. notes	6	489,000
Ohio Traction Co. notes	6	350,000
Total		$839,000

October

Toronto & York Radial Ry. 1st	5	$1,640,000
Milford, Attleboro & W. St. Ry.	5	300,000
Total		$1,940,000

November

Brasilian Tr., Lt. & Pr. 3-yr. nts.	6	$7,500,000
Memphis St. Ry. 2-yr. notes	6	1,250,000
Total		$8,750,000

December

Boston Suburban Elec. notes	4	$1,100,000
Kans. City Rys. 2-yr. nts. s. A.	6	1,000,000
Bay State Street Ry. notes	6	357,000
Total		$2,457,000

Bonds and notes maturing in January	$5,769,000
Bonds and notes maturing in February	5,522,000
Bonds and notes maturing in March	12,914,000
Bonds and notes maturing in April	14,162,000
Bonds and notes maturing in May	3,134,000
Bonds and notes maturing in June	18,744,500
Bonds and notes maturing in July	37,288,000
Bonds and notes maturing in August	5,266,000
Bonds and notes maturing in September	839,000
Bonds and notes maturing in October	1,940,000
Bonds and notes maturing in November	8,750,000
Bonds and notes maturing in December	2,457,000
Total electric railway maturities	$116,785,500
Grand total all public utility issues	$261,887,600

The following electric railway bonds, due in 1919, have been called for payment prior to their due date:

Issue:	Due '19	Called	Amount
Pug Sd Trac, Lt. & Pwr 6s	Feb. 1	Aug. 1, '18	$10,067,000
Monon. Val. Trac. notes 6s	Feb. 1	Oct. 1, '18	2,829,000
W. Penn. Pw. 2-yr. nts. 6s	Aug. 1	Jan. 7, '19	2,000,000
Total called bonds			$14,896,000

The following electric railway bonds, due in 1919, have been extended to a later maturity:

	Due '19	Extended to	Amount
Min. St. Ry. 1st 5s.	Jan. 15	Jan. 15, '22	$5,000,000

Plan to Reclaim Road

The committee of residents and property owners from Ocean City, N. J., and near-by places appointed to take steps toward purchasing the Ocean City Electric Railroad by popular subscriptions has decided to start at once to acquire the road.

Frank H. Stewart, J. Frederick Martin and Harry Headley, Ocean City, have been appointed a committee to consult with J. Pithian Tatem, solicitor for the railway, and the Henry D. Moore Corporation, the largest stockholders. The committee, headed by William E. Massey, president of the Ocean City Title & Trust Company, plans to convert the roadbed into a figure eight shape, permitting the cars to traverse some of the main business streets of Ocean City, with continuous service thereon, and with limited, but sufficient service for South Ocean City.

Some time ago the bondholders' committee of the company notified the City Commissioners that it was planned to "junk" the road, because of its inability to meet running expenses. An offer was made to sell the road to the city for $84,000. Mayor Champion then called a meeting of the citizens to consider the matter.

Wants Its Rental

Cornelius S. Sweetland, secretary-treasurer of the United Traction & Electric Company, Providence, R. I., on Dec. 26 notified the officers of the Rhode Island Company, that unless payment of rental of leased lines, due on Dec. 24, was made on or before Jan. 26 the United Traction & Electric Company would take over and operate the Rhode Island Company's properties under provisions embodied in the lease. Similar action was taken last September when payment was due. The rental due on Dec. 24 amounts to $149,500.

The notice was served on the federal trustees, who hold the stock of the Rhode Island Company. The trustees two days before had decided to defer the payment of the rental indefinitely, because of the decision of the War Labor Board, which instructed the Rhode Island Company to pay $72,066 to its employees, on or before Dec. 24. This sum represents one-third of the total of back wages due the employees under a previous award of the War Labor Board.

Twice during the past year the wages of employees have been increased, once voluntarily on the part of the company in May and again in October following an award of the War Labor Board. Fares have also been increased twice, but the burden of higher operating costs has more than offset the advance in fares.

The Rhode Island Company is controlled by the New York, New Haven & Hartford Railroad through ownership of the entire capital stock. By the dissolution agreement made with the government in 1914, the New York, New Haven & Hartford Railroad transferred to five trustees, 96,855 shares, constituting the entire capital stock of the Rhode Island Company. The trustees were chosen for a term of five years. The electric railway system comprises 353 miles of electric railway and 8.41 miles of steam railroad, of which 39.92 miles are owned and 321.63 miles are leased, serving the cities of Providence, Pawtucket, Central Falls and all the rest of Rhode Island.

Capital Issues Suspends

Committee May Resume Its Functions If Necessary—Legislation to Check Worthless Securities

The Capital Issues Committee, a specially created arm of the Treasury Department for the control of the issue of new securities during the war, announced that it would suspend its activities on Dec. 31. Chairman Hamlin of the committee warns the public of and directs the attention of Congress to the menace to holders of government bonds through the uncontrolled issue of fraudulent and worthless securities. Secretary Glass, in an accompanying statement, says that he will ask for legislation to check the traffic in worthless securities.

2000 APPLICATIONS EXAMINED

From May 17, the date of its organization, to Oct. 21 the committee examined more than 2000 applications. The proposed security issues totaled more than $3,000,000,000. About 20 per cent of these applications were disapproved. These were mostly of a character involving new extensions, which would not be contributory to the winning of the war.

The committee will not be dissolved but will remain inactive, unless it is found that the sale of new securities competes unduly with government financing or for other reasons it may become desirable for the committee to resume its work, pending its dissolution by the President or by operation of law.

It is the intention of the Capital Issues Committee to make a supplemental report to Congress recommending a law to prevent impositions upon the investing public.

Secretary Glass made this comment on the action taken:

"The decision of the Capital Issues Committee to suspend its activities should not be interpreted by the business public as a warrant for any expenditure of capital for needless or unwise purposes, whether public or private in their nature. Should it become apparent that voluntary restraints are not being exercised so as to prevent the misuse of capital, I shall request the committee to resume its control.

INVESTOR SHOULD BE PROTECTED

"My chief misgiving in accepting the action of the committee arises out of the need the committee has frequently expressed, and the importance of which has become increasingly obvious, of protecting the public investor against the flood of worthless or doubtful securities which threaten the market when the restrictions are removed, and present conditions emphasize the importance of obtaining emergency legislation as speedily as possible, so as to be able to cope effectively with this evil. The government not only should protect itself as to future bond issues, but, as well, owes a duty to the millions of Liberty bond buyers to restrain reckless and fraudulent promoters, particularly at this time.

"I intend to ask Congress immediately for legislation that will check the traffic in worthless securities while imposing no undue restrictions upon the financing of legitimate business, and shall urge that it be made effective before the close of the present session. Meantime, it may become necessary before such legislation is passed to reassemble the committee for the purpose of resuming its functions."

WORK OF COMMITTEE REVIEWED

In the period between May 17 and Dec. 7 the Capital Issues Committee had 2855 applications submitted to it for a total of $3,172,912,000. Of this amount $441,733,000 was for construction and equipment, $148,156,000 for working capital, $694,402,000 for refunding and $1,290,055,000 for purposes of exchange. The total passed was $2,574,346,000 and the total disapproved $598,566,000.

There were 308 applications from public utilities. The total applied for from this source was $755,656,000. Of this amount $167,215,000 was for construction and equipment, $6,429,000 for working capital, $255,648,000 classified by refunding and $302,427,000 for purposes of exchange, etc. The total of public utility issues passed was $731,719,000 while the total disapproved was $21,937,000.

Brockton & Plymouth Road to Continue

Under Chap. 288, Acts of 1918, Massachusetts Legislature, the towns of Hanson, Pembroke and Plymouth have voted to extend financial aid to the Brockton & Plymouth Street Railway rather than to have the property suspend operation through inadequate revenue. Stone & Webster, managers of the road, have announced that the service will be continued.

Under the new agreement the present board of directors will resign with the exception of one representative of the company who will remain on the board. The other directors will be chosen from the various towns served. It is planned to increase the present 6-cent fare unit to 10 cents. If the revenue is then inadequate, the deficiency is to be made up from local tax levies. It is expected that the town of Kingston, adjoining Plymouth, will shortly enter into an agreement with the company along the lines above indicated.

A six months' agreement has been accepted by the town of Plymouth, but the other towns have signed an agreement covering one year's operation.

The Brockton & Plymouth Street Railway operates 24 miles of standard gage electric railway connecting Plymouth, Kingston, Pembroke, Hanson, Whitman and Brockton. It has twenty-eight motor cars and eight other cars and sells energy for lighting and power purposes.

Evansville Reorganization

New Company Incorporated and Plans Being Worked Out for Reorganization After Foreclosure

The Evansville & Ohio Valley Railroad, Evansville, Ind., has filed articles of incorporation with the Secretary of State of Indiana, presumably as the successor of the Evansville (Ind.) Railways, operating the Evansville & Eastern Electric Railway, the Evansville, Henderson & Owensboro Railway and the Evansville & Mount Vernon Railway. The new company is capitalized at $1,500,000. The directors are Marcus S. Sonntag, William H. McCurdy, C. Howard Battin, Albert F. Karges, William A. Koch, William A. Carson, and Chris M. Kanzler, Evansville, Ind., Wesley Wilson, Newburgh, Ind.; Danby E. Cadick, Grandview, Ind., and Charles E. Tennis, Pittsburgh, Iowa.

PROTECTIVE AGREEMENT DRAWN

A protective agreement for the holders of the first mortgage 5 per cent gold bonds of the Evansville & Eastern Electric Railway, Evansville & Mount Vernon Electric Railway and the Evansville Terminal Railway was drawn some time ago. On the protective committee are Messrs. Walker, Karges, McCurdy, Sonntag, Jewett, McKee, Gwin, Rhodes and Batlin. In a circular to the depositing bondholders dated Sept. 19 they gave notice of the adoption of a plan of reorganization, to be put into effect in the event of the purchase of the properties by them.

Under this plan the successor company will have $1,000,000 of common stock exchangeable for common stock of the Evansville Railways, $500,000 of 6 per cent non-cumulative preferred stock exchangeable for preferred stock of the Evansville Railways, $200,000 of first mortgage 6 per cent thirty-year bonds issuable for rehabilitation, $1,200,000 of first and refunding 5 per cent thirty-year bonds, $750,000 of thirty-year income bonds limited to a 5 per cent return, and $300,000 of ten-year collateral trust 6 per cent notes.

NEW MORTGAGE PROPOSED

The new bonds will be secured by a mortgage covering all of the properties of the Evansville & Eastern Electric Railway, the Evansville & Mount Vernon Electric Railway and the Evansville Terminal Railway, together with the Evansville, Henderson & Owensboro Railway, subject, however, in the case of this property to $203,600 of preferred stock and to a mortgage securing bonds which are to be issued as collateral for the ten-year notes. The present outstanding bonds and notes of the various companies will be exchanged on the basis of 50 per cent in first and refunding 5's and 50 per cent in general mortgage incomes for the existing issues.

The Evansville (Ind.) Railways went into the hands of W. A. Carson, vice-president, as receiver early in November.

Financial News Notes

Ironwood & Bessemer Bonds Offered.—Halsey, Stuart & Company, New York, N. Y., and Chicago, Ill., are offering $200,000 of first mortgage 5 per cent bonds of the Ironwood & Bessemer Railway & Light Company, Ironwood, Mich. The bonds are dated Feb. 11, 1911, and are due on Feb. 1, 1936. They are being offered at 87 and interest, to yield 6¾ per cent.

Cleveland Interest Fund Again at Minimum.—The November receipts of the Cleveland (Ohio) Railway enabled it to credit $91,804 to the interest fund, which again brought it above the minimum of $300,000. There was a deficit of $80,270 in the fund, created before the maximum rate of fare specified in the Tayler ordinance was increased. The total receipts for the month were $1,140,593.

Springfield Issues Approved.—The Springfield (Ill.) Consolidated Railway has been authorized to issue capital stock to the amount of $79,500 by the Illinois Public Utilities Commission. The company was also authorized in the same order to issue $107,000 of 5 per cent gold bonds maturing in thirty-five years and secured by a mortgage to the Fidelity & Columbia Trust Company and L. N. Bender, trustee, Louisville, Ky., under date of June 1, 1913.

Files Mortgage for Record.—The Fort Smith Light & Traction Company, Fort Smith, Ark., has filed for record a mortgage to secure $1,000,000 of 5 per cent bonds dated Sept. 3, 1918, and due in 1921. The Continental Trust & Savings Company, Chicago, Ill., is made trustee. The new mortgage is subject to a mortgage of $6,000,000, made in 1911.

City Would Intervene in Receivership.—Corporation Counsel Byers of Des Moines, Iowa, acting for the city, has filed a petition of intervention in the Federal Court at Des Moines, alleging that the North American Construction Company, complainant in the action which threw the Des Moines Ciy Railway into the hands of the receiver, is controlled by the same interests that own the railway. He asks that the court dismiss the receivership on the ground that the action was brought not to settle a controversy, but solely to force the railway into bankruptcy.

Seven Per Cents Replace Sixes.—The East St. Louis & Suburban Company, East St. Louis, Ill., has advised holders of its five-year 6 per cent bonds due on Jan. 1, 1919, that it proposes to create a new issue of 7 per cent two-year convertible bonds, maturing on Jan. 1, 1921 to take care of the maturing bonds. Interest on the old convertible 6's was paid as usual on Jan. 1. The new bonds will be offered at 99 per cent in exchange for present issue, with 1 per cent discount, payable in cash. Bondholders are asked to deposit their holdings with the Pennsylvania Company for Insurance on Lives & Granting Annuities, Philadelphia.

Plans for Saving Small Ohio Line.—A. T. Van Diense, general manager of the Columbus, Delaware & Marion Electric Company, Columbus, Ohio, has made a proposition to the residents of Richwood and Magnetic Springs to finance the Columbus, Magnetic Springs & Northern Railway, which has not been in operation for some time. This road connects Delaware and Richwood. It is due to be sold some time in January. People of the towns through which the road passes and along the line are endeavoring to raise funds to meet the offer made by Mr. Van Diense, who also proposes to furnish electric light and power service to Richwood.

Employees' Wages 56 Per Cent. of Gross.—In speaking of the volume of business of the Dallas (Tex.) Railway, Richard Meriwether, general manager, said the company now is maintaining an organization of more than 800 employees, consisting of 600 motormen and conductors, 100 mechanical and electrical men and 180 track workers. In the executive and accounting departments, about sixty persons are employed. Mr. Meriwether said: "At present we are paying in salaries to employees $90,000 a month. The gross income of the company normally is about $160,000 a month, and $90,000 of this is returned in the way of wages and salaries to employees. During the middle of the day in normal times the company operates an average of 104 cars in regular service and during the rush hours it operates 190 cars."

New Cities Service Debentures.—The directors of the Cities Service Company, New York, N. Y., on Dec. 30 announced that the company would offer at par and interest $10,000,000 new series C 7 per cent debentures to stockholders of record of Dec. 31, 1918, the subscriptions from stockholders closing on Jan. 25. The offering of new debentures has been underwritten by a syndicate of bankers. In case any of the $10,000,000 should remain unsubscribed for by the stockholders the unsubscribed portion is to be offered to the public by the banking syndicate. The new series C debentures were created in the following manner: The stockholders authorized an issue of $30,000,000 of 7 per cent debentures, series B. Of these $12,500,000 were classed as series B, and then the issue was closed. In place of the $17,500,000 authorized as series B, the directors on Dec. 30 authorized an issue of $17,500,000 series C debentures, of which $10,000,000 are now being offered. The series C debentures are convertible on and after Jan. 1, 1921, into nine shares of Cities Service preferred stock and one share of common, together with the accumulated cash and stock dividends on one share of common stock to the date of conversion.

Electric Railway Monthly Earnings

AURORA, ELGIN & CHICAGO RAILROAD, WHEATON, ILL.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Oct., '18	$173,235	*$169,133	$4,102	$37,909	†$33,807
1m., Oct., '17	181,128	*135,239	45,889	35,619	10,270
10m., Oct., '18	1,775,304	*1,530,066	245,238	361,838	†116,600
10m., Oct., '17	1,819,988	*1,301,182	518,806	357,279	161,527

BATON ROUGE (LA.) ELECTRIC COMPANY

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Oct., '18	$21,564	*$13,398	$8,166	$3,939	$4,227
1m., Oct., '17	19,338	*10,119	9,219	3,616	5,603
12m., Oct., '18	256,810	*136,038	120,272	45,705	75,067
12m., Oct., '17	228,746	*114,337	114,409	42,591	71,818

BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Oct., '18	$6,247	*$9,295	†$3,048	$1,434	†$4,482
1m., Oct., '17	9,509	*10,226	†717	1,286	†2,003
12m., Oct., '18	106,281	*118,601	†12,320	16,571	†28,891
12m., Oct., '17	124,190	*123,838	352	14,386	†14,034

CLEVELAND, PAINESVILLE & EASTERN RAILROAD, WILLOUGHBY, OHIO

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Oct., '18	$43,362	*$32,277	$11,085	$16,193	†$5,108
1m., Oct., '17	44,939	*32,250	12,689	11,692	917
10m., Oct., '18	460,188	*308,505	151,683	120,468	31,217
10m., Oct., '17	454,347	*281,900	172,447	116,839	55,609

EASTERN TEXAS ELECTRIC COMPANY, BEAUMONT, TEX

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Aug., '18	$94,589	*$59,658	$34,931	$14,315	$20,616
1m., Aug., '17	79,889	*45,958	33,931	12,419	‡23,733
12m., Aug., '18	1,054,375	*586,760	467,615	153,682	‡331,079
12m., Aug., '17	916,137	*498,222	417,915	125,164	‡301,672

EL PASO (TEX.) ELECTRIC COMPANY

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Sept., '18	$104,289	*$73,645	$30,644	$6,744	$23,900
1m., Sept., '17	105,017	*67,806	37,211	6,592	30,619
12m., Sept., '18	1,261,203	*845,119	416,084	80,002	336,082
12m., Sept., '17	1,278,051	*767,460	510,591	63,385	447,206

LAKE SHORE ELECTRIC RAILWAY, CLEVELAND, OHIO

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Oct., '18	$176,118	*$141,018	$35,100	$35,822	†$ 722
1m., Oct., '17	142,840	*107,995	34,845	35,321	†476
10m., Oct., '18	1,809,869	*1,303,542	506,327	361,112	145,215
10m., Oct., '17	1,475,625	*999,418	476,207	346,848	129,359

NEW YORK (N. Y.) RAILWAYS

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Oct., '18	$934,683	*$821,178	$113,505	$277,131	†‡$120,815
1m., Oct., '17	1,103,614	*819,086	284,528	281,993	‡53,022
4m., Oct., '18	3,513,819	*3,213,793	300,026	1,112,438	†‡438,739
4m., Oct., '17	4,388,906	*3,189,394	1,199,512	1,122,607	‡272,793

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* Includes taxes. † Deficit ‡ Includes non-operating income

Traffic and Transportation

Zone Plan Postponement

President McCarter Believes Problem Solved—Commission Grants Extension of Two Months

Thomas N. McCarter, president of the Public Service Railway, Newark, N. J., before the Public Utilities Commission on Dec. 30 requested and received an extension of two months of the period for the preparation of the zone fare report. In the order of the board of last July granting the company the right to charge 1 cent for transfers there was a stipulation that it investigate the possibilities of a zone system and submit the report of its discoveries on or before Jan. 1. The extension which has now been allowed fixes the date for delivering the report as March 1.

NEW PLAN FAIR TO ALL

Mr. McCarter declared the company believed its report would provide a zoning plan "fair to the public and fair to the company." One of the big problems, he said, had been the matter of the collection of fares as the cars pass through the zones that will exist on many of the lines, but he believed this had been solved.

In opening his statement Mr. McCarter said that immediately after the board had incorporated its zone inquiry stipulation in the July order the company had given the question serious consideration. As the first step a committee had been named, with himself as the head, to make the investigation. The other members of the committee were Richard E. Danforth, vice-president and general manager of the railway company; Harry C. Donecker, the assistant general manager; L. D. Howard Gilmour, general solicitor, and Matthew R. Boylan, general auditor.

The committee, he said, had held frequent consultations with Dr. Thomas Conway of the Wharton School of Finance, University of Pennsylvania, and that a sub-committee had later been formed by it. This committee visited every city where zones had been tried. Mr. McCarter said:

WORK OF SUB-COMMITTE DESCRIBED

"This sub-committee has given unremitting attention to the matter. It has employed approximately 100 young men to ride the cars on given days and make tests of the riders for purposes of comparison as to lengths of rides and other facts and we think the tests made have been most comprehensive. This work took some time and involved the expenditure of a very considerable sum. There were two chief questions involved: First, it is possible to devise a plan of zoning that will be fair and acceptable to the public and fair to the company, and second, if devised, was it practicable to collect fares? This question of the collection of fare was early recognized as a very serious matter.

"It would not be practicable to put the zone plan into immediate effect. There are numerous mechanical changes that would be necessary and these would require some time. When our report is complete we might file it as a rate schedule to bring the matter to a hearing with the possibility of making it effective July 1. I think we could be ready by that time."

In granting the time extension President Slocum of the commission said:

"The board knows the company has been working on this matter and that a serious effort is being made to meet its stipulation. It also knows that if its engineers are given access to the company's minutes no time will be lost by granting additional time, and it is therefore granted."

Columbus Fare Brief Filed

Attorneys for the Columbus Railway, Power & Light Company, Columbus, Ohio, filed a brief in the United States Supreme Court on Dec. 27 in support of the company's claim that the city cannot compel it to carry passengers at the rate of fare specified in its franchise. This is the case brought by the company in the United States District Court recently to prevent the enforcement of the terms of the franchise relative to the rate of fare and in which Judge D. C. Westenhaver announced that the court is without jurisdiction to interfere with a contract of that kind.

Arguments presented in the brief follow:

The claim of the city is based on the proposition that the two franchise grants represent contracts and that these contracts impose obligations upon the Columbus company to continue operating its street railway lines under these franchise grants and to charge the rates of fare therein described. The petition of the plaintiff and appellants may be summarized as follows:

1. The franchise ordinance granted permission to operate street cars on the streets of the city upon the terms and conditions therein prescribed, and the company was bound to comply with these terms and conditions so long as it continued to exercise the franchises, but these grants were permission only and have been surrendered and abandoned by the company. Its reasons for such surrender and abandonment were that the rates of fare prescribed in the grants were no longer compensatory but on the contrary had become confiscatory.

2. The situation that has been brought about by the war resulting in a most unexpected increase in operating expenses of all kinds and particularly the compulsory annual wage increase of $560,000, due to the award of the National War Labor Board, cannot be held to have been within the contemplation of the parties when the franchises were granted and accepted and under these circumstances the company is entitled to a release of the obligations, if any, that these grants may have imposed upon it to continue to operate under them.

Transfer Report Released

Results of Conferences With Washington Companies and of Independent Study Now Made Public

Sixteen transfer points, eight of which the companies already have agreed to accept, are recommended by John A. Beeler, expert for the Public Service Commission of the District of Columbia, for establishment between the lines of the Capital Traction Company, the Washington Railway & Electric Company and the Washington-Virginia Railway. The fact that this report had been made to the commission was noted in the ELECTRIC RAILWAY JOURNAL for Dec. 28, page 1157. The report itself, however, was not released by the commission until Dec. 26. It will be considered on Jan. 7.

The Beeler suggestions which are not concurred in by the companies contemplate the exchange of transfers at the busiest railway intersections.

Congestion will be increased at these intersections and Mr. Beeler points out the companies may not be able to carry all the passengers who will want to make use of the transfer privilege. They can, however, even during this period, carry some of them, and during a greater part of the day carry all of them.

Objection of the companies to transferring passengers from suburban to city lines develops in the report as being the biggest stumbling block in the way of universal transfers. It is the crux of the entire situation, Mr. Beeler declares. The companies agree, he states, that, once this is solved to the satisfaction of all parties, the principal difficulty will have been removed.

The reasons given by the companies for their objection to transferring suburban passengers to city lines follow:

1. The suburban passenger is now receiving more than full value for the fare he gives the company, and, therefore, no extension should be made for the benefit of a class already being served at a loss.

2. The long suburban lines have been built and operated with the idea that they should act as feeders only to the lines of the company that is sustaining and developing them. To open these lines as feeders to another company which bore no part of the expense of development appears to the companies unjust as well as a source of financial loss.

Figures are presented by Mr. Beeler in support of his conclusion that inter-company transfers will not affect materially the financial interests of the companies. He points out that at five of the transfer points recommended paid inter-company transfers now are in effect. He proposes that the transfer arrangements outlined in his report shall receive a trial during a period sufficient to determine what the exact financial results will be. If it develops that an injustice is being done by the issuance of free inter-company transfers, an arrangement should be made to compensate the companies.

Renew Fare Pleas

New York Companies Point Out Wherein Conditions Under Five-Cent Fare Spell Disaster

Theodore P. Shonts, president of the Interborough Rapid Transit Company, New York, N. Y., in a letter to the Public Service Commission and the Board of Estimate, made public on Jan. 1, urged 8-cent fares on that company's subway and elevated lines and wrote in detail "of the serious situation confronting the dual subway enterprise." He said that the city could gain nothing by starving the Interborough into bankruptcy.

COMPANY AND CITY PARTNERS

In his letter Mr. Shonts describes the situation of the Interborough with the pooling arrangement between the company and the city in effect. At the outset he gives the history of the dual system, and tells of the invitation by the city for the company to share in the enterprise. The plan, he says, provided that the Interborough should contribute $58,000,000, estimated at that time as one-half the cost. The agreement called upon the company to supply an additional $22,000,000 for equipment. The Interborough, he says, raised $160,000,000 by the sale of 5 per cent first and refunding bonds for both subway and elevated improvements. Then the letter says:

> In view of the interest of the city and its taxpayers in the matter, it seems incumbent upon the company again to advise you, as the taxpayers' representatives, of the serious situation confronting the dual subway enterprise. The Interborough had accumulated a cash surplus of $10,000,000 out of which to take care of operating losses during the lean years heretofore mentioned. Had it not been for the war such a sum would have been ample, with a 5-cent fare. But it is no longer adequate, and it is rapidly being exhausted.
>
> For the year ended June 30, 1918, there was a deficit of subway earnings of $620,438 and of elevated earnings of $2,306,818 compared with the amounts the company was entitled to receive under its contracts. These deficits are payable out of future revenues, with interest compounded semi-annually, before the city is entitled to any share in either subway or elevated earnings.
>
> For the fiscal year ending June 30, 1919, the outlook is much worse. Based on the actual figures for the four months ended Oct. 31, 1918, the trend indicates that on June 30, 1919, the deficit under the subway contract will be $3,887,000, and under the elevated contracts, $4,952,000, or a total accrued for the year of $8,839,000 ahead of the city's right to a return for the year ending June 30, 1919. To this must be added the accruals of last year, so that the aggregate subway accruals as of June 30, 1919, without interest, will be $4,507,438, and the elevated accruals, also without interest, $7,258,818, or a total of $11,766,256.
>
> If the fare be increased to 8 cents, recourse to taxation will not only be prevented but the city will receive from the Interborough lines over $2,000,000 in cash into its treasury.
>
> The Interborough Company is entitled to borrow cash against the accruals and thus continue in possession of the property under the leases. But if for any reason it should not be able to raise the money because the city kept it down to a 5-cent fare, and a receivership should follow, the situation would not be changed so far as the city is concerned—indeed, it might be worse, because receivership certificates might be necessary, which would be a paramount lien, thus setting the city's investment further to the rear.
>
> The city can gain nothing by starving the Interborough into bankruptcy. On the contrary, it can indirectly do itself great financial damage through the impairment of approximately $500,000,000 of securities in the combined Interborough system.
>
> It is with great reluctance that the word panic is used in this communication, but the time has come for plain speaking, and it would be a failure of duty to one partner in an enterprise not to point out that the bankruptcy of the other partner might be so disastrous as to result in a financial cataclysm.
>
> The city may by continued refusal to increase fares precipitate bankruptcy and still have to face the problem of increasing fares to escape ruinous taxation. If the city were in possession of the railroads a continuation of a 5-cent fare would be at the expense of the taxpayers and contrary to the spirit of the rapid transit act.

B. R. T. MUST HAVE MORE

Timothy S. Williams, president of the Brooklyn Rapid Transit Company, said on Jan. 1 that without doubt renewed efforts would be made to secure authority to charge a 7-cent fare. He referred to the fact that many cities had permitted the electric railways to increase their fares to 6 and 7 cents. He discussed the "antagonistic attitude" of the Public Service Commission and the Board of Estimate, and of the delay in completing the rapid transit lines.

Indianapolis Denied Six Cents

As the result of an opinion of E. I. Lewis, chairman of the Public Service Commission of Indiana, and concurred in by the other members of the commission, the Indianapolis Traction & Terminal Company has been denied an increase in fare to 6 cents. The company is, however, permitted to continue to charge a 5-cent fare until 100 days after the signing of the treaty of peace, but it was instructed to withdraw the 1-cent charge for transfers on Dec. 31. The commission says that in spite of the apparent increase in facilities the service rendered by the company remains inadequate. On the important point of a return on the investment the commission says in part:

> Petitioner does not plead for an order based on return on reasonable and prudent investment. The plea is for an order establishing rates that will maintain the solvency of petitioner by the payment of operating expenses and "maturing obligations."
>
> In its original decision the commission passed finally and negatively on petitioner's contentions that fixed charges of securities, issued and outstanding, constituted legal and binding obligations which the State must recognize. With equal decisiveness, the commission declined to recognize, even in acting under the emergency section, the inclusion of annual sinking fund charges as an obligation of patrons.
>
> The commission reiterates its declaration that it will not become confused as to the mandate of the Legislature which, according to the interpretation under which it proceeds, is to take the value of the property, used and useful for the service of the public as a basis for rates.
>
> It is inconceivable that the Legislature, in the enactment of section 122, contemplated that the State should (1) guarantee, in times of emergency, values which never existed; (2) protect excess securities; (3) make good losses caused by negligence in collection of revenues, or (4) reward a lack of thrift in times of prosperity.
>
> The emergency section does not seem even to extend to the most meritorious petitioner the assurance of a return on investment that might be declared to be the proper rate of return in a normal period. To use the emergency section to protect obligations for which the commission is unable to find some reasonable basis in values would amount to making the State the protector of unwarranted obligations at the very time when there is a strong tendency for legislation to restrict issuance of unwarranted securities of all kinds.

Fare Advance Voted

Residents of Cedar Rapids Go on Record in Favor of Fare Advance

In an election held on Dec. 17, the Cedar Rapids & Marion City Railway was authorized to increase its fares to 6 cents. The increase was carried by a majority of seventy-eight. It went into effect at once. Previous to the election a commission made up of representatives of the Chamber of Commerce, union labor and leading citizens recommended to the City Council of Cedar Rapids that the increase be granted.

TWO COMPANIES AFFECTED

The fares on the lines of the Iowa Railway & Light Company, which also operates in Cedar Rapids, were not covered by city franchise, but the Cedar Rapids & Iowa City Railway, which is included in the system of the Iowa Railway & Light Company, assumed a 6-cent fare at the time that rate was granted to the Cedar Rapids & Marion City Railway.

Last February the local branch of the railway union submitted a new wage demand to the Cedar Rapids & Marion City Railway. The matter was debated for several weeks. Finally the men were informed that the increase in wage would be allowed effective at once provided the City Council would grant an increase in fares. The Council found itself powerless to do anything under the terms of the franchise, but after it was suggested that the matter be left to a vote of the people the Council gave its consent.

The local Chamber of Commerce and the Federation of Labor indorsed the 6-cent fare and during the ten days previous to the election made an open and vigorous campaign in its favor. Public speakers were sent into the wards where the working people live and the matter was placed squarely before them. The voters were informed that if the measure was defeated it would almost certainly mean unsatisfactory service and might even result in the abandonment of some lines. The railway took no part in advocating the increase. There was no advertising campaign through the newspapers, no appeal to the public. The newspapers merely printed the news of the campaign as it progressed.

OPPOSITION FROM UNEXPECTED QUARTERS

Some opposition developed to the proposed increase in fares, but the vote in the wards inhabited by those dependent almost entirely on the railway for transportation was "yes" while the "no" vote was cast in the wealthier wards.

The Cedar Rapids & Marion City Railway is controlled by the United Light & Railways Company. It operates in all 27.5 miles of line, a considerable part of which is in Cedar Rapids.

Cincinnati Fare Increases Automatically

Under an automatic provision of the revised railway franchise in Cincinnati, Ohio, the rate of fare on the lines of the Cincinnati Traction Company for adults was advanced to 5½ cents on Jan. 1, 1919. At the same time children's fares were made one-half of the adult fare or an advance of ¼ cent. Official announcement to this effect was made by W. C. Culkins, street railroad director, following receipt of a letter from Walter A. Draper, vice-president of the Cincinnati Traction Company, notifying him that the earnings during October and November had been insufficient to meet operating expenses. Beginning Jan. 1 six adult tickets for 33 cents and four children's tickets for 11 cents were placed on sale. Cash fares for adults are now 6 cents and for children 3 cents. The new franchise provides that fares shall be increased ½ cent if for the period of two calendar months the income of the city lines is not sufficient to cover the cost of service.

Transportation News Notes

Brooklyn Skip Stops to Go.—The Public Service Commission for the First District of New York has ordered the Brooklyn Rapid Transit Company to discontinue skip stops.

Committee Reports on Louisville Fare.—A committee of the Board of Trade of Louisville, Ky., which has been investigating earnings and expenses of the Louisville Railway Company before recommending an increase in fares, has reported back to the board, but no definite action has been taken as yet.

Westerville Line May Increase Fares.—Indications point to an increase in the rates of fare on the Columbus-Westerville line of the Columbus Railway, Power & Light Company, Columbus, Ohio, according to Commissioner John Scott. The working capital is now only slightly above $15,000, which marks the turning point. The road fell short in November and he believes this will be repeated for December.

Fare Case Carried to Court.—The Dubuque (Iowa) Electric Company plans to take the half-fare ticket case before the United States Circuit Court of Appeals at St. Paul. City Attorney Czizek has been asked by the company to agree to the filing of a supersedeas bond which would protect the patrons of the company against loss but would result in the discontinuance of the sale of half-fare tickets until an opinion is handed down by the appeals court.

Colorado Springs Wants More.—The petition of the Colorado Springs & Interurban Railway, Colorado Springs, Col., for an increased fare, which was announced some time ago, has been filed with the Public Utilities Commission of Colorado. While no definite figure was asked, attorneys for the company feel that a 7-cent fare would be justified, because of the proposed increase in wages to employees to meet the scale in other cities and the rapidly mounting costs of materials and other factors in operation.

Michigan Two-Cent Fare Law Valid.—Federal Judge Sessions, in a decision handed down in the case brought by the Grand Rapids, Grand Haven & Muskegon Railway, Grand Rapids, Mich., against the State to test Michigan's 2-cent fare law and restrain the State from enforcing it, held that the law is valid. He dismissed the company's petition, which was based on the grounds that the law was confiscatory on account of war-time conditions. This suit was referred to previously in the ELECTRIC RAILWAY JOURNAL for July 27, page 173, and Oct. 12, page 676.

Weymouth Refuses Subsidy.—Residents of East Weymouth, Mass., at a special town meeting recently, retorted to a notification from the Bay State Street Railway that certain lines in the town would be discontinued, with a recommendation that in the event of discontinuance of service by the road, the local authorities be urged to revoke the grants of location under which the company is operating in the town and take steps to remove all poles, rails and equipment from the streets. A motion was adopted pronouncing inadvisable a proposal for the town to contribute $13,500 to the company to enable it to continue certain lines.

City Contends Cases Differ.—The decision of the Supreme Court of Missouri in the so-called St. Louis 6-cent fare case, referred to in the ELECTRIC RAILWAY JOURNAL for Dec. 28, page 1155, is said not to affect Kansas City, except as indicating the possible decision of the court in the Kansas City case. City officials of Kansas City, Mo., indicate that the position of Kansas City is different from that of St. Louis; and that even if a decision is rendered that is favorable to the local railway the city will appeal. In the St. Louis case the Supreme Court overruled the lower court and held that the commission was within its rights in authorizing a 6-cent fare.

Auburn Waives Fare Clause.—The Common Council of Auburn, N. Y., by unanimous vote, has adopted a resolution whereby the city of Auburn has waived the electric railway franchise contract clause prohibiting a charge of more than 5 cents on city lines, to Owasco Lake and Soule Cemetery, thus making it possible for the Auburn & Syracuse Railway to go before the Public Service Commission with its application for an advance in fares. The resolution adopted by the Council waives the prohibitory clause for the period of the war, or until peace is finally declared, and for such a length of time thereafter as the Council shall deem wise.

Grand Rapids Increase in Effect.—The Grand Rapids (Mich.) Railway began charging a 6-cent fare on Dec. 5 in accordance with permission recently granted by the City Commission and noted in the ELECTRIC RAILWAY JOURNAL for Nov. 16, page 904. The City Commission, however, made the fare ordinance subject to the will of the people at the November election on a referendum petition. No petitions were filed against the increased fare and it, therefore, went into effect without having come to a vote. Unusual interest attached to the Grand Rapids appeal because of the way in which the local papers met the fare issue. This phase of the matter was referred to in this paper for Sept. 28, page 594.

Wants Additional Omaha Facts.—The State Railway Commission of Nebraska has denied the application of the Omaha & Council Bluffs Street Railway for an emergency increase in fares from 5 cents to 7 cents. The commission has, however, continued the application for further hearing and directed that the books of the company be examined and a valuation of the company's holdings be made in order to arrive at a final decision. The commission says it does not deny that the company should be granted an increase to meet the increased operating expenses, but that the company's valuation figures submitted with the application were not sufficient to form an opinion as to how much the advance in rates should be.

Rochester Still Needs More.—James F. Hamilton, president of the New York State Railways, has made a statement in part as follows about fares in Rochester: "We are still trying to get a 6-cent fare in Rochester. The reduction of service during January, even if it became permanent, would save the company only $650 a day. When the first fall of snow comes the company must put on 100 men to clear the tracks and this will use up $400 a day of the saving made by the reduction of service. The balance will be expended for equipment. This amount is not a drop in the bucket. We are losing money in the Rochester district every day we operate. We have lost $1,000,000 in the last eighteen months. We are not asking for a permanent 6-cent fare, but for an increase that will enable us to give good service and pay the interest on our bonds during the unusual conditions prevailing of high prices for material and labor. A 6-cent fare would not return a cent in dividends to the stockholders, but would give the people good service and pay the interest on the bonds." The reduction in service to which Mr. Hamilton refers was decided upon after conference with the Public Service Commission for the Second District. It was referred to in the ELECTRIC RAILWAY JOURNAL for Dec. 21, page 1118.

Personal Mention

P. R. T. Changes

Charles V. Weston, George Weston and Horace L. Howell Appointed to the Philadelphia Rapid Transit Company

Charles V. Weston has been appointed operating manager of the elevated and subway lines of the Philadelphia (Pa.) Rapid Transit Company. Mr. Weston was formerly president of the South Side Elevated Railroad, which is now a part of the Chicago Elevated Railroads. He has taken an active part in the development of Chicago's rapid transit system, having supervised the construction of the West Chicago Street Railroad tunnel in 1891-94 and having been chief engineer of the construction of the Northwestern Elevated and Union Loop, as well as of many extensions of the Lake Street Elevated and South Side Elevated. Since his resignation from the presidency of the South Side Elevated, following the consolidation of the Chicago elevated lines, Mr. Weston has been engaged largely in valuation and other expert work for electric railways.

GEORGE WESTON ALSO GOES TO PHILADELPHIA

George Weston, engineer for the Board of Supervising Engineers, Chicago Traction, has resigned his position, effective Jan. 1, and will also become associated with the same company. Mr. Weston has been engaged in electric railway work for the past thirty-one years. He received his training in civil engineering by private instruction and entered engineering work in 1880 on the Missouri, Kansas & Texas Railway at the age of nineteen years. Since that time he has done engineering work on various steam lines, has established a reputation as an appraisal engineer of electric railway properties and has been engaged in the construction and engineering operation of electric railways in the city of Chicago for many years.

GEORGE WESTON ON CHICAGO BOARD SINCE ITS CREATION

Upon the creation of the Board of Supervising Engineers at Chicago, in 1907, Mr. Weston was made assistant chief engineer. In 1908 he became a member of the Board of Supervising Engineers to represent the city of Chicago and later became engineer for the board, which position he has held to date. Mr. Weston is a member of the American Society of Civil Engineers, American Institute of Electrical Engineers, Western Society of Engineers, Chicago Engineers' Club, Engineers' Club of New York City, and the American Electric Railway Association.

Horace L. Howell, who has for the past five years been connected with the Board of Supervising Engineers, Chicago Traction, in the capacity of assistant engineer, has resigned and has also accepted a position with the Philadelphia Rapid Transit Company.

Mr. Jackson New Boston Trustee

James F. Jackson of Boston, former chairman of the Massachusetts Railroad Commission, has been appointed a trustee of the Boston Elevated Railway to fill the vacancy caused by the resignation of W. M. Butler, former chairman of the board. The nomination was confirmed by the executive council on Dec. 31 under suspension of the rules.

Mr. Jackson is a native of Taunton, Mass. He was educated at Harvard College and Boston University, graduating from the law school of the latter in 1875. He was city solicitor of Fall River from 1880 to 1889 with the exception of one year, and was elected Mayor of that city on the Republican ticket in 1888 and again in 1889. From 1899 to 1908 he was chairman of the Massachusetts Railroad Commission, predecessor of the Massachusetts Public Service Commission, and his term was signalized by distinguished and constructive service in electric railway regulation, coupled with unusual ability in clearly stating the essentials of complex issues before the board.

Since retiring from the commission, Mr. Jackson has been engaged in private law practice at Boston, having represented the Bay State Street Railway as general counsel in various rate proceedings and other matters. To a representative of the ELECTRIC RAILWAY JOURNAL Wednesday Mr. Jackson expressed his appreciation of the present difficulties of the electric railway financial problem, pointing out the importance of transportation and the interest with which his new duties will be undertaken.

E. W. Tynan has been appointed claim agent of the New York, Westchester & Boston Railway, New York, N. Y., to succeed W. A. Cokeley.

R. E. Town has been appointed auditor of the Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa., to succeed C. W. Clover.

C. C. Yawkey, formerly vice-president of the Wisconsin Valley Electric Company, Wausau, Wis., has been elected president of the company to succeed Neal Brown.

G. C. Blankner and **G. G. Brownell** have been appointed assistant secretaries of the Cities Service Company, New York, N. Y., to succeed Carle B. Gilbert.

Judson Zimmer, master mechanic of the Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., has also been appointed to succeed F. A. Bagg, resigned.

E. F. Meyers, treasurer of the Philadelphia & Garrettford Street Railway, Upper Darby, Pa., has also been appointed secretary of the company to succeed V. A. Hengst.

G. A. Roffe has been appointed general manager and purchasing agent of the Susquehanna Traction Company, Lock Haven, Pa., to succeed T. C. Keller.

L. A. Reinhardt has been appointed assistant secretary and assistant treasurer of the Eastern Pennsylvania Railways, Pottsville, Pa., to succeed W. C. Austin.

F. P. Bagley, formerly treasurer of the Center & Clearfield Railway, Philipsburg, Pa., has been appointed assistant secretary of the company to succeed F. W. Gregory.

Stephen C. Pohe has been appointed vice-president and general manager of the Center & Clearfield Railway, Philipsburg, Pa., to succeed Warren Partridge.

Joseph B. Eastman of Massachusetts has been named a member of the Interstate Commerce Commission, vice George W. Anderson, whose term of office has expired.

B. D. Haskins has been appointed claim agent of the Chattanooga Railway & Light Company and the Lookout Mountain Railway, Chattanooga, Tenn., to succeed M. J. Horan.

B. F. Wilson has been elected vice-president of the Wisconsin Valley Electric Company, Wausau, Wis., to succeed C. C. Yawkey, who has been elected president of the company.

J. R. Hagy has been appointed secretary and treasurer of the City Electric Company, Albuquerque, N. M., to succeed Lloyd Sturges, who has been elected vice-president of the company.

George A. Peirce has been appointed secretary of the Puget Sound Traction, Light & Power Company and subsidiary companies, with headquarters at Boston, Mass., to succeed T. C. Crawford.

Benjamin C. Bower has been appointed master mechanic of the Trenton & Mercer County Traction Corporation, Trenton, N. J., to succeed H M. Rhoda.

C. E. Fritts, superintendent of power and electrical distribution of the Kansas City (Mo.) Railways, has resigned. Mr. Fritts had been connected with the company for twenty-one years.

B. F. Mortimer, formerly with the Public Service Company of Oklahoma, has accepted a position as superintendent of distribution with the Okmulgee Ice & Light Company, Okmulgee, Okla.

R. E. Morrison has been appointed engineer maintenance of way of the

Chattanooga Railway & Light Company and the Lookout Mountain Railway, Chattanooga, Tenn., to succeed E. R. Dike.

Lloyd Sturges, formerly secretary and treasurer of the City Electric Company, Albuquerque, N. M., has been elected vice-president of the company.

P. C. Eichhorn has been appointed auditor and purchasing agent of the Seattle & Rainier Valley Railway, Seattle, Wash., to succeed Frank W. Goodhue.

J. I. Newell has been apointed electrical superintendent of the British Columbia Electric Railway Company, Ltd., Vancouver, B. C., to succeed W. M. Fraser.

M. Murphy has been appointed secretary of the Seattle & Rainier Valley Railway, Seattle, Wash., to succeed Walter M. Brown, who still retains his position as general manager of the company.

W. Fred Jacobs has been appointed secretary of the Danville & Sunbury Transit Company, Danville, Pa., to succeed Charles P. Hancock, who still retains his position as treasurer of the company.

Henry Ellard has been appointed chief engineer to the Trenton & Mercer County Traction Corporation, Trenton, N. J., to succeed A. E. Gulliver, who resigned to engage in special work for the British government pertaining to marine operations.

Charles Zoller has been named superintendent of the Indianapolis & Cincinnati Traction Company, Indianapolis, Ind., to succeed Lewis Henry, deceased. Mr. Zoller has been acting as claim agent of the company for some time. He will have his headquarters at Rushville, Ind.

J. H. Vanderveer has recently been appointed master mechanic of the Maryland Electric Railways at Annapolis, Md. He was for five years in the engineering department of Stone & Webster, specializing on the development of the one-man car. He is a graduate of Stevens Institute of Technology.

H. R. Palmer, chief of the lighting and power department of the Virginia Railway & Power Company, supplying railway service and electric light and power to Richmond and other cities of Virginia, will become general manager of the Harrisburg Light & Power Company, Harrisburg, Pa., to succeed C. M. Kaltwasser, vice-president and general manager of the company.

H. A. Nicholl, general manager of the Union Traction Company of Indiana, Anderson, Ind., has returned to Indiana from Hampton Roads, Va., where for several months he was government manager of transportation of the Hampton Roads district. The position in Virginia was a new one for the period of the war and Mr. Nicholl was granted leave of absence by the Union Traction Company in order to assume the place.

Matthew C. Brush, who has been vice-president of the American International Corporation, New York City, has been elected president of the American International Shipbuilding Corporation. The corporation is engaged in shipbuilding, having the largest shipyard in the world, that at Hog Island, Philadelphia, Pa. On Oct. 28, 1918, Mr. Brush was elected chairman of the board of directors of the Boston Elevated Railway.

Daniel A. Scanlon has been appointed acting superintendent of transportation of the Northern Ohio Traction & Light Company with headquarters at Akron, Ohio, succeeding Frank I. Hardy, resigned. For the last fourteen years Mr. Scanlon has been superintendent of the Southern Division of the Northern Ohio Traction & Light Company, with headquarters at Canton, Ohio. Prior to that time he was connected with the Raleigh (N. C.) Traction Company and the Columbus, Buckeye Lake & Newark Railway, Springfield, Ohio.

Edgar Harrison, appointed division passenger and freight agent of the Union Traction Company of Indiana at Anderson, has been with the Union Traction Company since Feb. 5, 1903, commencing as a motorman on the city lines at Anderson. He was on several divisions of the Union Traction as trainman, and knows the system well. He is studious and very observing and in order to qualify for advancements has recently completed successfully special studies in traffic work during his leisure.

General H. T. Douglas, who has been connected with the work of construction of the Interborough Rapid Transit Company, New York, N. Y., as principal assistant engineer of the Rapid Transit Subway Construction Company since December, 1899, has retired from service. He took an important part in the construction of the subways from the beginning until their completion, and gave to the work not only his engineering skill and untiring energy, but the benefit of a very broad and varied experience in railroad and engineering work.

B. N. Grosvenor, recently appointed superintendent of power plants of the Union Traction Company of Indiana, succeeding E. E. Jones, has had considerable experience in the mechanical and steam engineering line. He started as a machinist, and from that calling was made assistant to the professor of steam engineering, at the Rose Polytechnic Institute, at Terre Haute. He left there to take charge of the power plant of the Louisville (Ky.) Railway, where he was located for seven years. After leaving the Louisville Railway, Mr. Grosvenor was in charge of the River Station of the Louisville Water Company for ten years.

Percy S. Turner, manager of the tramway department of the British Westinghouse Electric Company, London, is in this country investigating the latest designs of electric car equipment used with high voltage installations. A more extended electrification of steam lines in England is considered desirable by most of the present railway officials. If the government takes over the lines according to the program already outlined, extended electrification may be postponed as the work will then, of course, depend on the attitude taken by the government. The various manufacturers are preparing to build any new equipment necessary in their own plants.

Obituary

George H. Harvey, general superintendent of construction for the Columbus Railway, Power & Light Company, Columbus, Ohio, died at his home in Columbus on Dec. 20 from influenza and pneumonia.

Maj. Charles B. Clegg, president of the Oakwood Street Railway, Dayton, Ohio, died on Dec. 16 after a long illness. Mr. Clegg became interested in Dayton railway properties when horse cars were used. He and John H. Winters, a banker, secured the controlling interest in the Dayton & Western Traction Company and assisted in completing the road. In conjunction with his son, Harrie P. Clegg, now an officer of the Dayton & Troy Electric Railway, the Oakwood Railroad and the Oakwood Street Railway, Dayton, he built the Dayton & Troy Traction line. Mr. Clegg was seventy-six years of age.

Angus Sinclair, Eng. D., publisher of *Railway & Locomotive Engineering* and for many years treasurer of the American Railway Master Mechanics' Association, died at his home in Milburn, N. J., on Jan. 1. He was seventy-seven years old. Mr. Sinclair was born in Scotland, where he received his early education. After coming to the United States he studied engineering at the University of Iowa. He received his degree of doctor of engineering from Purdue University. Mr. Sinclair at one time was editor of the *American Machinist* and later of the *National Car Builder*. In 1886 he established, with the late John A. Hill, the *National Engineer*, whose name was later changed to *Railway & Locomotive Engineering*, the paper with which he has been actively associated during recent years. In addition to his connection with the American Railway Master Mechanics' Association, of which he has been treasurer since 1901, Mr. Sinclair has been identified with many technical associations, among them the American Society of Mechanical Engineers, the Master Car Builders' Association, the Air Brake Club and the Travelling Engineers' Association. He was one of the founders of the last mentioned organization.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER,
SALESMAN AND PURCHASING AGENT
ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Volume of Purchasing Low During 1918

Review of Production, Distribution and Sales of Electric Railway Equipment During Past Twelve Months

A year mixed with good and bad business has just closed. On the whole the electric railways purchased less during 1918 than during any one of the last ten years. Here and there a business booked an extraordinary large volume of sales. In such cases the article in question was as a rule something comparatively new on the market and for which a demand had arisen on account of the abnormal conditions created by the war.

Pneumatic door-control equipment and one-man car devices, for instance, sold well. Devices to increase economy had the largest call. Each of the different types of devices for giving readings whereby it is possible to reduce the energy consumption per car-mile were in good demand.

More Cars Purchased Than in 1917

Besides, the war brought large sales in specific localities. Wherever there were shipyards or large industrial centers employed in war work the transportation facilities as a rule were found insufficient and additional rolling stock was required. As a result a number of large orders for rolling stock were placed during the year. These brought the total purchases of cars of all kinds for 1918 beyond that for 1917 by a hundred or so. The total number of new cars built in 1918 was 2419 against 2455 in 1917. However, only eighty-nine cars were built in railway company shops in 1918 while 281 were so built in 1917.

It is interesting to see the stride taken by the one-man car in 1918. Of this type 644 were ordered against but 280 in 1917. That this type is beginning to play a large part in the rolling-stock market is seen by comparing the 1918 orders for both one-man and two-man city cars. Of the latter the 1918 orders reached 1074, but 450 more than the one-man total. One car builder in August stated that fully 90 per cent of the year's inquiries for city cars were for the one-man type.

Nor is that all. The rolling-stock orders were not as large as they might have been had deliveries been better. Reports have been received from more than one road that owing to the length of time that they would have to wait it was decided best to postpone purchasing. Shipments, however, were not as bad as was generally believed. Late in February prominent car builders notified the ELECTRIC RAILWAY JOURNAL that shipments could be had in from five to six months. On top of this, however, the railways had to wait some time depending on transportation. If the orders were war transportation orders delivery could be secured more promptly.

Fussiness of car design was not tolerated last year by the builders. Standard design was the rule. If special construction was desired the purchaser found that promised delivery became quite too long.

The conditions of long delivery and immediate requirements resulted in a number of roads going into the used-car market. Little help was here found. Some managers are known to have traveled hundreds and hundreds of miles in an effort to locate and secure a few used cars. Probably at no other time has the market been so bare of second-hand rolling stock. As the year closed conditions were much easier and cars could be secured without any trouble.

Track construction and maintenance offered a very poor field for sales in 1918. Some 410 miles, or less than 1 per cent, was added to the total track mileage. About 150 miles of track was rebuilt out of a total of almost 50,000 miles. Almost all of this work was in small sections.

Government Takes Rail Output

To a large extent, of course, it must be remembered that war requirements prevented purchasing for track construction and maintenance. Some roads were favored in securing new track because of making extensions to shipyards or other war plants. Speaking generally there were no rails available for electric railways last year until after the armistice was signed, when a few tons were shipped on back orders.

Government orders called for a greater production of rails than the mills could handle. There were some rails that had been rolled for Russian roads that were offered for domestic consumption. As a makeshift it is understood that some of these were used by electric roads.

Freight handling for the electric roads opened on the Pacific Coast and elsewhere and to take care of this there was some purchasing of freight cars and trailers although most of such rolling stock was probably built in company shops.

The severity of the winter early last year made for a nice volume of buying in some lines. Trolley wire sold very well for maintenance because of the snow storms. Snow and ice removal equipment was in a brisk demand, especially scrapers, sleet cutters and thawing apparatus. Also there was a large demand in January for immediate delivery of snowplows. These, however, are not kept in stock and take some time to build so that this market went unsatisfied. It is interesting to note in this connection that very few orders were placed during the spring and summer months for snowplows and sweepers.

Maintenance Prompts Buying

Winter conditions also brought a heavy demand for coils. Sales of these continued in good volume throughout the year. Railways formerly used to do most of their coil winding in their own shops but the scarcity of labor in the past year prevented much of this work. This resulted in large sales by the manufacturers.

Maintenance needs prompted most of the buying by traction companies. Welding outfits were in good demand. The necessity for conserving old material added increased duties to welding equipment for shop use and for repairing tracks, and lines.

The carbon brush market was active throughout the year. Car wheel sales were limited to maintenance needs. Car roofing, on the other hand, was very quiet.

In many lines owing to a demand from other than electric railways there was a shortage during the year. These included such items as track and track hardware, construction and track tools and tool handles, window glass and shop equipment.

In many of these lines production was curtailed because of the necessity for conservation of raw materials, transportation, fuel and labor. All tool production was reduced considerably in the number of types and sizes. Metal badges for platform men, condenser equipment many lines of electrical equipment, all were curtailed. These restrictions were removed shortly after the armistice was signed.

On July 26 the War Trade Board placed restrictions on the importation of rattan. Manufacturers of car seating, track sweepers and brooms, however, were sufficiently well fixed so that the industry never suffered from a shortage of supply. This restriction, also has been lifted.

Railway motor demand was not very active. One manufacturing concern early made up a fair stock but otherwise motors were built as ordered.

In the summer months there was a renewed interest in fare boxes. A considerable demand arose also for slack adjusters, owing to labor shortage and conservation measures. These were shipped in carload quantities.

Deliveries varied considerably. On much small equipment there were good stocks available and immediate shipments could be made. On large equipment, however, such as poles, deliveries were greatly delayed owing to transportation troubles.

PRICES WERE HIGHER IN 1918

Prices continued to mount during the year in spite of the small demand from traction companies. There is hardly an item that did not advance in price at least once—rolling stock, track, hardware, paints, glass, etc.—all except wire—hit new high levels. Wire on the average was lower than in 1917 because copper was much lower.

Cotton was by no means an insignificant factor in the year's higher prices. Trolley, bell and register cord, insulated wire, waste cotton, coils and insulation reflected the advancing cost of cotton.

As the year closed some prices came down. The most conspicuous ones were rails and wire.

What to do with scrap became a real question for many roads last year. Scrap iron and steel and other old metals brought high prices up to the time the armistice was signed, when the bottom fairly dropped out of this market. Whether to sell for the high prices or to hold for repair and further use came up continually. The government fixed maximum prices for scrap iron and steel. For old rails $35 per ton was allowed and $47.50 for old railway axles. Owing to conditions of the market railways were not always able to dispose of their holdings at such high prices. Nevertheless, much more was realized for scrap in 1918 than ever before.

Electric railway credits received more than the usual scrutiny in the year just past. On the whole, however, collections were in good shape considering the conditions. Not so many roads took advantage of the cash discount as formerly, and also settlements took longer generally than they used to. Still they were made.

Up to Nov. 11 electrical manufacturers were generally working to the extent that they could get labor to operate the machinery. Since that time there have been many cancellations of war and other contracts, and incoming business is now small. The total output of electrical goods for the year was probably no larger than in 1917, which was in the neighborhood of $750,000,000. Throughout the year labor first and raw materials second have been the controlling factors. In addition to a very acute shortage of each, labor has been very undependable. Dilution was tried and found in most instances to work very well. Women as a rule were found to be more dependable in the work in which they were employed than men.

Wage scales for industrial labor advanced by leaps and bounds. The government labor board did much to prevent loss of time through strikes, but it pretty generally recommended higher wages and the shortening of working time to eight hours. This latter did not actually shorten the hours of work but materially increased wages by making it possible to get in more overtime work. Labor priorities were outlined, and in one instance in the industry labor was in serious danger of being drafted.

Raw materials, particularly iron, steel, copper, tin and brass, were insufficient to supply the demand. Substitutes were urged, particularly for brass. Prices of these products were fixed by the government with provisions for maximum output, but even so there was not enough, to go around. The natural result was that along in the summer the War Industries Board began to limit the supply of raw materials through priority certificates in accordance with the essential character of the production. Nothing was termed non-essential, but many lines of production were considered less essential to the winning of the war than others.

POWER EQUIPMENT MARKET

Large power equipment was hard to get throughout the year. Turbines of over 500 hp. were taken under complete government control as to distribution. After the fighting stopped deliveries on large turbines were quoted at four months and longer, depending on the condition of the individual factories. At the close of the year there was still a large volume of unfilled business in steam turbines.

The transformer demand was not so large last year as in the preceding year. In April it was reported to be down to about 70 per cent of that for 1917.

Around the first of June power equipment, including motors, generators, turbines, transformers, etc., advanced around 10 per cent.

A number of manufacturers began to study the export field during the year. There were quantities of inquiries from South America, but the ban on shipping made it hard to do business. However, as soon as the war ceased the manufacturers began to show unusual activity.

Metal prices, generally speaking, were much lower at the close of the year than at the opening. Copper, which owing to the continuance of the government price of 26 cents until Jan. 1, is apparently higher, was actually being offered for resale during the last two weeks of the year at 21 cents. Producers late in December agreed on a price of 23 cents for export.

All Priorities Are Officially Canceled

Formal Announcement Made of the Passing of Priorities Rules and Pledges on Jan. 1

Circular No. 60 of the Priorities Division of the War Industries Board, addressed to all concerned, says: "Effective Jan. 1, 1919, all the rules, regulations and directions of every nature whatsoever issued by the Priorities Division of the War Industries Board are hereby canceled, and all pledges heretofore made on the suggestion or request of the said Priorities Division are hereby revoked."

This is signed by Edwin B. Parker, Priorities Commissioner, and approved by Bernard M. Baruch, Chairman War Industies Board. It is dated Dec. 20.

Dick, Kerr & Company's Annual Report

The annual meeting of Dick, Kerr & Company, Ltd., was held in London on Nov. 14, and important plans of the future were outlined by the chairman. He referred to the acquisition as announced last year of the bulk of "B" preference stocks of Willans & Robinson, Ltd., and said that the work of consolidating the organization of the company with those of Willans & Robinson and the United Electric Car Company has been completed. An alliance has also been made with Siemens Brothers & Company, Ltd., by which much economy can be effected through the amalgamation of selling organizations and co-ordination of designs and products. There is no competition in manufacture as Siemens Brothers & Company made cables, dynamo machinery, telephones, etc., while Dick, Kerr & Company have specialized in apparatus for railways and tramways, steam turbines and the larger classes of electrical machinery. It has also been decided to establish companies in France and in Japan to exploit manufacturing rights in connection with apparatus for railways and tramways. In the belief of the chairman there would be a large after-war demand for all classes of electrical machinery, especially large-sized steam turbines, and he assured the shareholders that the company's facilities for taking care of this demand would be ample.

Coal Price and Zone Regulations Continue

Maximum prices on coal and zone regulations will not be removed before Feb. 1, 1919, United States Fuel Administrator Harry A. Garfield. announced recently.

Track and Roadway

Muscle Shoals Traction Company, Florence, Ala.—A second survey has been completed of part of the proposed Muscle Shoals Traction Company's line between Huntsville and Florence, via Athens. The government has made arrangements with the Muscle Shoals Traction Company to use its terminal in Florence and is desirous of having the company build branch lines to Dams Nos. 2 and 3. Thurston Allen, Florence, secretary. [Sept. 21, '18.]

Municipal Railway of San Francisco, San Francisco, Cal.—The Board of Supervisors has adopted an ordinance authorizing the Board of Public Works to prepare plans and specifications and to enter into contract for the reconstruction of tracks on a portion of Taraval Street and for the construction of a line on a portion of Brighton Street.

United Railroads of San Francisco, San Francisco, Cal.—Mayor Rolph and J. N. Lilienthal, president of the United Railroads of San Francisco, recently signed the agreement between the city and the United Railroads providing for the joint use of street railway tracks west of Twin Peaks. By the agreement the city will get the right to operate over the United Railroads' tracks on Taraval Street in the Parkside district from Twentieth to Thirty-third Avenues and the use of the Ocean Avenue line to Herold Avenue in the Ingleside section. The necessary ordinance has been passed providing for the payment by the city to the United Railroads of $100,000 for this latter privilege, while the city, under the arrangement, must reconstruct the United Railroads' tracks from Twentieth to Thirty-third avenues in the Parkside section.

United Railways & Electric Company, Baltimore, Md.—Contract and plans have been filed in Baltimore County by the United Railways & Electric Company for its proposed double-track extension to the yards of the Bethlehem Shipbuilding Corporation at Sparrows Point. The estimated cost of construction is $145,472.

Boston, Mass.—Special investigators of the Commission on Waterways and Public Lands have started a study of the traffic over the recently inaugurated trolley freight line connecting the Fish Pier in South Boston with the Boston Elevated system, in order to determine the possibilities of an extension of the service. The commission proposes, if the plan is found to be practical, to have the Fish Pier line extended over the State-owned lands so that it will serve the Commonwealth Pier, the dry dock, and the embarkation terminal, which the War Department is building.

New York Municipal Railway, Brooklyn, N. Y.—The Public Service Commission for the First District of New York has approved an opinion by Commissioner F. J. H. Kracke, and has directed the preparation of a final order fixing the status of the Culver Elevated Line in Brooklyn as a branch of the Fourth Avenue subway. The order will also provide that the Culver line shall be operated as a part of the Fourth Avenue subway when the Whitehall-Montague Street tunnel line shall have been completed and placed in operation. This plan will require that when the new Culver elevated structure in Brooklyn is placed in operation a month or so hence it will be operated as the present Culver line is operated, namely in connection with the Fifth Avenue elevated line in Brooklyn. Thereafter when the tunnel line is completed the Culver trains will be made up of steel cars and diverted near the Ninth Avenue station into the Fourth Avenue subway.

Power Houses, Shops and Buildings

British Columbia Electric Railway, Ltd., Vancouver, B. C.—Work will be begun next spring by the British Columbia Electric Railway on the construction of a receiving station for freight at Chilliwack.

Washington & Old Dominion Railway, Washington, D. C.—A report from the Washington & Old Dominion Railway states that it has ordered three 1000-kw. transformers, six 100-kw. transformers and portable substation outfit of 300-kva. transformer and rotary, etc.; also material for changing 14-mile division high-tension 22,000 volts to 33,000 volts.

Winona (Ind.) Interurban Railway.—The Winona Interurban Railway has completed the installation of a complete coal handling apparatus in its power plant at Winona Lake, Ind. The coal is taken from the storage bins to hoppers and thence to the stokers. The equipment was furnished by the Weller Manufacturing Company, Chicago. The company will purchase one new wheel press and in addition one boring mill.

Pascagoula Street Railway & Power Company, Pascagoula, Miss.—It is reported that the Pascagoula Street Railway & Power Company will construct a new power plant.

Kansas City (Mo.) Railways.—A tract of land 100 ft. x 300 ft. has been purchased by the Kansas City Railways just east of the company's present carhouse at Ninth and Washington Streets and will be used by the company for the storage of cars. The company will in the near future construct a double-deck carhouse on the ground which it now owns. The difference in the street elevation makes the location particularly desirable, there being one grade on the Washington Street side and another on Ninth Street.

Ithaca (N. Y.) Traction Company.—The power plant of the Ithaca Traction Company at Ithaca was recently destroyed by fire, causing a loss of about $75,000. The plant has supplied electricity for operating the railway system and for local lighting service and will be rebuilt immediately.

Columbus (Ohio) Depot Company.—The City Council of Columbus has passed an ordinance extending the period within which the Columbus Depot Company may begin the construction of the proposed interurban railway station at the corner of Town and Rich Streets.

Northern Cambria Railway, Patton, Pa.—A contract has been placed by the Northern Cambria Railway with the General Electric Company, Schenectady, N. Y., for one 300-kw. motor generator set, and power will be purchased from the Pennsylvania Central Light, Heat & Power Company shortly after Jan. 1, 1919.

Philadelphia (Pa.) Rapid Transit Company.—Plans are being made by the Philadelphia Rapid Transit Company for the construction of a one-story brick addition to its substation used in connection with service in Philadelphia, to cost about $12,000.

Dallas (Tex.) Railway.—Plans have been made by Fred A. Jones Construction Company, Dallas, for enlarging the Interurban Building at Dallas by the erection of an 8-story addition to the 2-story portion and a 2-story addition to the 8-story portion of the building.

Professional Notes

V. I. Smart, formerly professor of railway engineering and transportation at McGill University, Montreal, and J. A. Burnett formerly electrical engineer with the Grand Trunk Railway system, are now associated as consulting engineers at the New Quirks Building, Montreal. The lines handled will be civil, electrical and mechanical, engineering.

Fuller Engineering Company, designing and constructing engineers, Allentown National Bank Building, Allentown, Pa., announces that Frederick A. Scheffler, formerly connected with the New York offices of the Babcock &Wilcox Company, has now become associated with them and will make his headquarters at their New York office, 50 Church Street. The Fuller Engineering Company is making a specialty of applying the pulverized-coal method of firing to boilers of all kinds for generating power, and Mr. Scheffler will be in a position to furnish complete information regarding the cost of installation, preparation and probable economies obtainable by the adoption of this method of firing coal.

O. S. Lincoln, Inc., Portland, Me., was enlarged on Jan. 1 and is now known as Lincoln, Hanson & Abbott, Inc. The two new partners were formerly with the Moulton Engineering Corporation, which has given up its Portland office, and one of them, Major Abbott, has just returned from service with the engineers in France. The new firm will occupy the same offices but will enlarge the scope of its work so as to cover civil, mechanical, hydraulic and electrochemical engineering in addition to electrical engineering. The firm proposes to go into the business of consulting and designing engineering and management of properties with renewed energy now that the great war is over. The Electrical Standardizing Laboratories will be retained and enlarged, leading to greater activities than have been possible in the past.

Rolling Stock

Mobile & Pensacola Railway & Navigation Company, Mobile, Ala., reports that it expects to purchase some cars during 1919.

Hydro-Electric Power Commission of Ontario, Canada, expects during 1919 to purchase six 50-ton all steel locomotives for the traction roads under its control.

Gulfport & Mississippi Coast Traction Company, Gulfport, Miss., reports that it expects during 1919 to purchase four four-motor street car equipments.

Norfolk & Western Railroad, Bluefield, W. Va., expects to order six electric locomotives during 1919. These locomotives will be duplicates of those now in use.

Gadsen, Bellevue & Lookout Mountain Railway, Gadsden, Ala., expects during 1919 to purchase three single truck cars, one closed and two 10 bench open cars.

Chicago, South Bend & Northern Indiana Railway and Southern Michigan Railway, both of South Bend Ind., and under the same management, expect to purchase twenty new city car motor equipments during 1919.

Trade Notes

Maschinenfabrik Oerlikon, whose works are at Oerlikon, near Zurich, Switzerland, recently filed a report at Zurich as to the nationality of its stockholders as far as it could be determined. Of the 16,000 shares outstanding 15,144 are held by Swiss citizens and only 706 by citizens of other nationalities. Holders of 150 shares did not reply to the inquiry. In other words, more than 94 per cent of the stock is held by citizens of Switzerland.

Wellman-Seaver-Morgan Company Cleveland, Ohio, has opened a San Francisco office at 415-417 Rialto Building, in charge of Norman S. Rose. He will give attention to business originating from California, Nevada west of the 115th meridian, lower California and the counties of Josephine, Jackson and Klamath in Oregon. The company has recently appointed Horace N. Trumbull as advertising manager. Mr. Trumbull was formerly advertising manager of the SKF Ball Bearing Company of Hartford, Conn.

Wheeler Condenser & Engineering Company, Carteret, N. J., announces that it has obtained from the Schutte & Koerting Company, of Philadelphia, through the Alien Property Custodian, the exclusive right to manufacture and sell steam jet air pumps under Patent No. 968,926 in connection with surface condensers, jet condensers, barometric condensers, vacuum pans and evaporating apparatus. This patent covers the valuable feature of two or more steam jets working in series with a condenser between the jets.

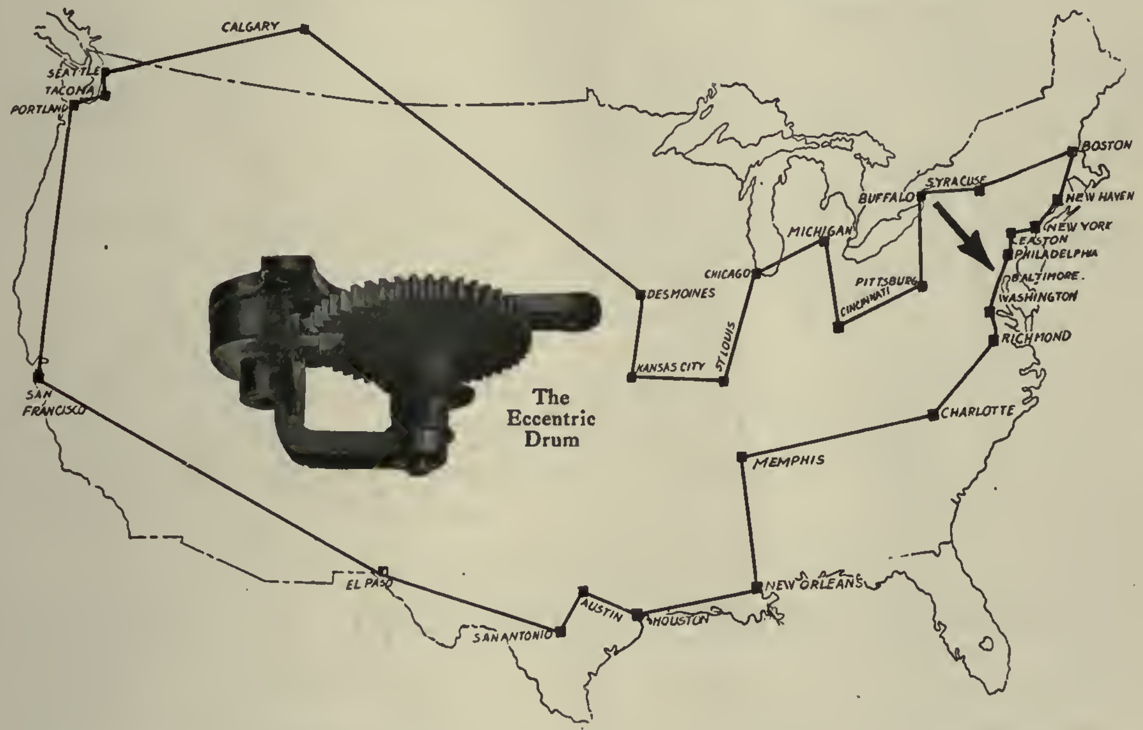
National Railway Appliance Company, New York, N. Y., R. A. Hegeman, Jr., president, announces the election of Fred C. J. Dell to the office of secretary of the company, effective Dec. 24, 1918. Mr. Dell has acted in the capacity of president's secretary of the company for the past two years, previous to which time he was connected with the American Electric Railway Manufacturers' Association as assistant to the secretary-treasurer, a position which he held from March, 1911, to May, 1916. In the latter year he resigned to assume charge of the detail work of the exhibit committee for the 1916 convention of the American Electric Railway Association, and in October, 1916, he was elected to the office of secretary of the American Electric Railway Manufacturers' Association, which position he still holds. Mr. Dell received his early training in the office of the vice-president and general manager of the Interborough Rapid Transit Company, where he was employed in a clerical capacity for a period of seven years under Vice-President Frank Hedley.

New Advertising Literature

Truscon Steel Company, Youngstown, Ohio, Pressed Steel Department: Folder of pressed steel shapes.

Walter A. Zelnicker Supply Company, St. Louis, Mo.: Bulletin No. 250, or that for January, 1919. It contains eighty-four pages.

Peacock Brakes from Coast to Coast



The Eccentric Drum

Every Car in Baltimore—2300 of them—Has a Peacock Brake or an Ackley Adjustable Brake

Many of them have no other brake equipment. All of one series, for instance, amounting to 325 cars, are operated with Peacock Brakes alone. The brakes for these cars (650 brakes) were paid for out of their savings in maintenance. Think of the yearly saving on this series of cars. No cylinders, no compressors, no governors, no engineer's valves to maintain. Simply the Peacock Brake, on which there have been no replacements for four years. Yet these cars are operated every day through the crowded and hilly streets in a city of over 600,000 inhabitants.

Do you wonder that the 170 new cars are Peacock-equipped?

Peacock Brakes will save you more money per dollar than any other investment you can make.

Next Stop —WASHINGTON

National Brake Co.

Buffalo, N. Y.

Bankers and Engineers

Ford, Bacon & Davis,
Engineers.
115 BROADWAY
New Orleans NEW YORK San Francisco

STONE & WEBSTER
Industrial Plants and Buildings, Steam Power Stations, Water Power Developments, Substations, Gas Plants, Transmission Lines, Electric and Steam Railroad Work.
NEW YORK BOSTON CHICAGO

THE J. G. WHITE COMPANIES
ENGINEERS CONTRACTORS
FINANCIERS OPERATORS
43 EXCHANGE PLACE . . NEW YORK
LONDON CHICAGO

SANDERSON & PORTER
ENGINEERS
REPORTS, DESIGNS CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS
RAILWAY, LIGHT and POWER PROPERIES
CHICAGO NEW YORK SAN FRANCISCO

THE ARNOLD COMPANY
ENGINEERS—CONSTRUCTORS
ELECTRICAL—CIVIL—MECHANICAL
105 South La Salle Street
CHICAGO

ALBERT S. RICHEY
ELECTRIC RAILWAY ENGINEER
Worcester Polytechnic Institute
WORCESTER, MASSACHUSETTS

REPUBLIC ENGINEERS, INC.
CONSULTING AND CONSTRUCTING ENGINEERS
Valuations *Reports* *Investigations*
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60 BROADWAY, NEW YORK
CLEVELAND, OHIO YOUNGSTOWN, OHIO
Illuminating Bldg. Mahoning Bank Bldg

Scofield Engineering Co. Consulting Engineers
PHILADELPHIA, PA.
POWER STATIONS GAS WORKS
HYDRAULIC DEVELOPMENTS ELECTRIC RAILWAYS

The Coal & Iron National Bank
of the City of New York

Capital, Surplus & Profits $1,635,000
Resources Nearly $10,000,000

Offers to dealers every facility of a New York Clearing House Bank.

H. M. Byllesby & Company, Inc.
NEW YORK CHICAGO TACOMA
Trinity Bldg. No. 208 So. La Salle St. Washington
Purchase, Finance, Construct and Operate Electric Light, Gas, Street Railway and Water Power Properties.
Examination and reports. Utility Securities Bought and Sold.

JOHN A. BEELER
OPERATING AND RATE INVESTIGATIONS
TRAFFIC SURVEYS AND SCHEDULES
Electric Railway Management—Supervision of Construction
ENGINEERING APPRAISALS
52 VANDERBILT AVE., NEW YORK

WOODMANSEE & DAVIDSON
ENGINEERING CO.
ENGINEERS
MILWAUKEE CHICAGO
First National 784 Continental & Commercial
Bank Bldg. National Bank Bldg.

You are a faithful subscriber and reader of the Electric Railway Journal. You know how useful it is to you. Why not give us the names of those of your electric railway friends who would also benefit by being subscribers to the Electric Railway Journal? We will be glad to send specimen copies to any names and addresses that you mention.
ELECTRIC RAILWAY JOURNAL

THE P. EDW. WISH SERVICE, Inc.
Suite 1710 DETECTIVES *Suite* 715
Park Row Bldg., New York Board of Trade Bldg., Boston

Frederick Sargent A. D. Lundy
Wm. S. Monroe James Lyman
SARGENT & LUNDY, *Engineers*
1412 Edison Bldg., 72 W. Adams St., Chicago, Ill.

ELECTRICAL TESTING LABORATORIES
Electrical, Photometrical and
Mechanical Testing.
80th Street and East End Ave., New York, N. Y.

Oil Waste 365 Days a Year
OIL

This picture is not exaggerated, for to a greater or lesser extent, this oil waste is being duplicated in hundreds of paint shops, repair shops, and oil storage rooms in Street Railway Companies throughout the country today.

This Waste is Preventable

The illustration below is a reproduction of a photograph taken in the oil storage room of a Street Railway Company in the South and shows a battery of Gilbert & Barker T-21-H Oil Storage Tanks and Pumps.

This Company has seen the folly of handling oil in the time-worn method of wooden barrels which means a big percentage of waste from seepage, oil soaked inflammable floors, and also waste both in oil, time, and labor as shown in the drawing at the top.

Waste is eliminated, fire hazard is reduced to the minimum. Convenient, clean, and economical, a Gilbert & Barker Oil Storage System for the handling of volatile, lubricating, and paint oils makes it possible to have, at all times, a positive check on receipts and deliveries — there is no guess work — you *pay only* for what you receive and you *use all* the oil which you pay for.

Whether you use 5 or 5,000 gallons a day, there is a Gilbert & Barker Oil Storage System to fill your requirements. The saving in oil, time, and labor will very soon pay for the installation.

GILBERT & BARKER MFG. CO.
G&B TRADE MARK
SPRINGFIELD, MASS., U.S.A. EST. 1865

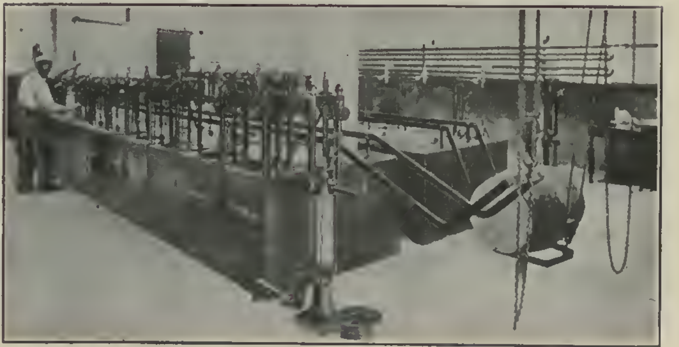
Put a stop to that waste now.
Send for Bulletin No. 60.
Today is a better day than tomorrow.
Write.

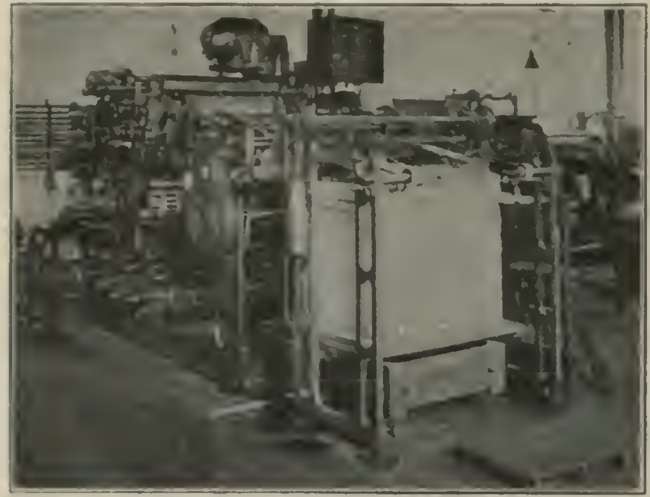
Gilbert & Barker Mfg. Co.
Springfield, Mass.

New York Office:
26 Broadway
Pittsburgh Office:
501 Manufacturers Bldg.

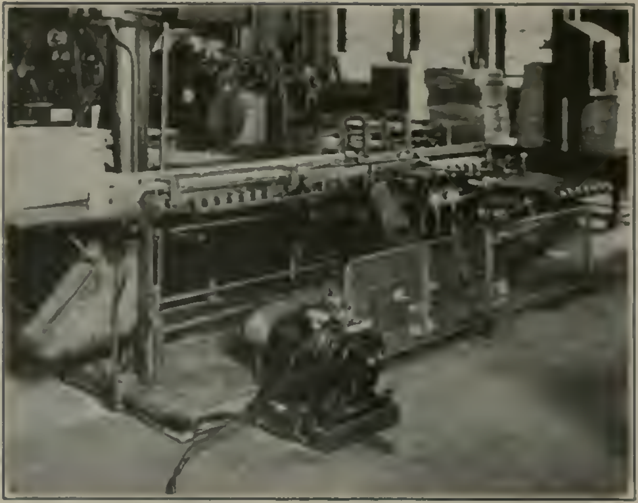
Philadelphia Office:
703 Lincoln Bldg.
Detroit Office:
Garfield Bldg.

Chicago Representatives:
Neidow & Payson, Madison Terminal Building





NEW ROTARY PRINTING PRESS INSTALLED



STITCHING MACHINE IN THE PRINTING ROOM

The Chicago Surface Lines met the growing demand for Transfers with the

Meisel Rotary Press

The Chicago Surface Lines handle more transfer passengers than any other street railway system in the world. Adequately to meet the growing demand for transfers a new Meisel rotary printing press was added recently to the equipment at the South Shore shops. The new press even when running below normal speed, 326 r.p.m. shaft speed, is more than able to take care of the transfer requirements. At low speed it turns out 132 sheets per minute, or 7920 per hour. The present output is at the rate of 43,000 sheets, or 4,128,000 transfers per day.

The system of providing transfers for the Surface Lines works out about as follows: Rolls of paper, 31 in. wide, of four different colors are always kept on hand, the average supply running from 300,000 lb. to 400,000 lb. Paper is fed into the press from a roll, and while passing through it receives four different impressions—back, front, serial number and dating heads. As it comes out it is cut into sheets of ninety-six transfers each, which are jogged into place. When 100 sheets are in place they are taken off by the operator.

The new press has been in operation only a short time, and it has never been necessary to work it to full capacity.

While the Chicago Surface Lines operate about 1000 miles of track and 172 different routes, the form of transfer which has been in use since 1914 has proved entirely satisfactory. And now they have a PRESS that's satisfactory—able to cope with all demands!

May we show you how your printing costs for transfers, bulletins, etc., etc., can be cut to minimum? Take the matter up with us.

THE MEISEL PRESS MFG. COMPANY
Boston, Mass.

GENERAL VIEW OF THE TRANSFER PRINTING ROOM

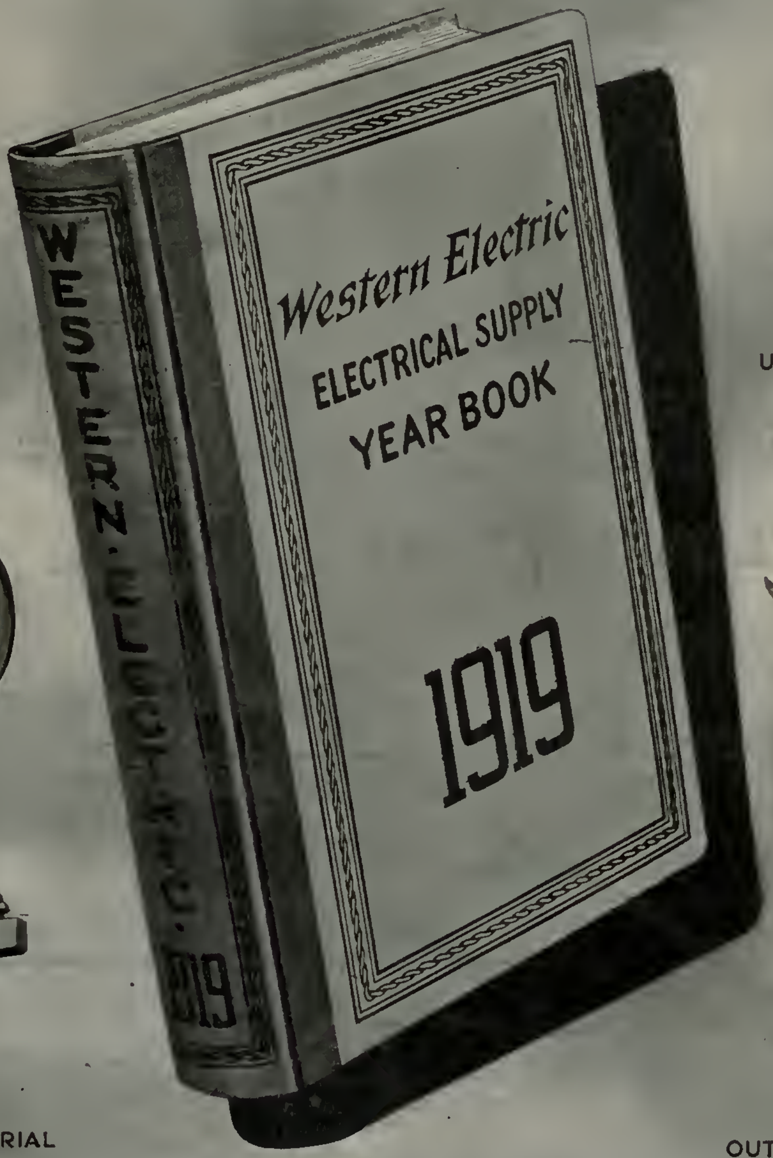
INTERIOR OF THE SORTING AND PACKING ROOM

YOUR ELECTRICAL EQUIPMENT IS LISTED IN THIS YEAR BOOK

FLOOD LAMPS

WIRE

POLE LINE MATERIAL



UTILITY MOTORS

INTER-PHONES

OUTSIDE TELEPHONES

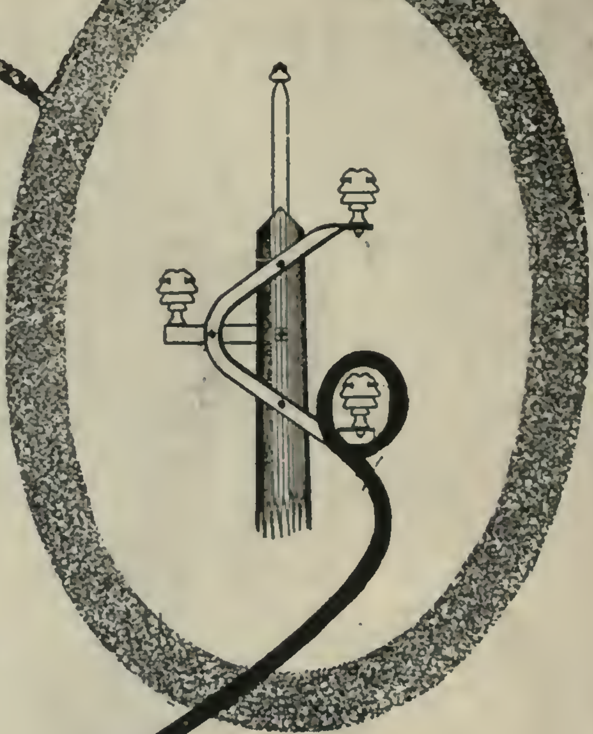
The Western Electric Year Book for 1919 will prove of invaluable assistance as an aid in the proper selection of reliable electrical equipment for electrical railways.

The uniform list price idea and the one basic discount will make it a simple matter to prepare estimates and requisitions.

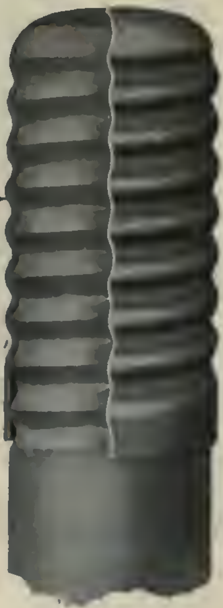
Write for your copy of the Year Book.

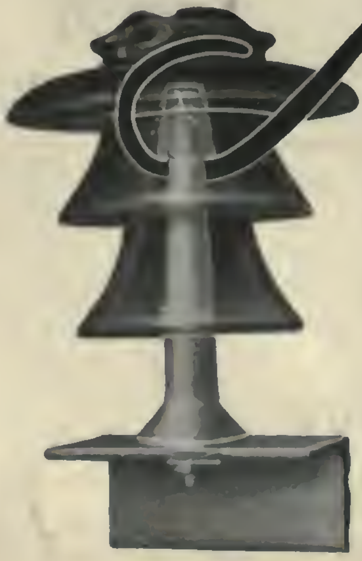
Western Electric Company
INCORPORATED
Offices in All Principal Cities

One 33,000 volt line on Bo-Arrow arms and Peirce Forged Steel Pins. Two 33,000 volt lines on Steel Angle arms and Peirce pins. (Pittsburgh, Pa.)



Bo-Arrow Arms and Peirce Pins





A close-up view of the forged steel Peirce Pin for high-tension lines. The threads of the thimble fit loosely over the threads of the pin, and a thin cork disc is provided between the top of the pin and the thimble. Under expansion the pin simply rides up further in the thimble, the cork disc compressing. None of the strain is communicated to the insulator.

Guaranteed to stand rated strains without danger to the insulator.

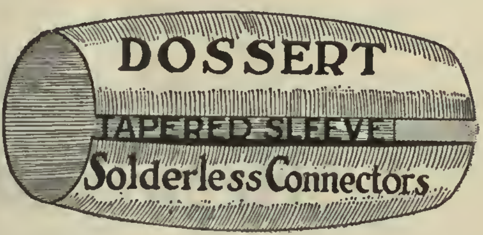
The Hardware MAKES the Line—Hubbard makes THE Hardware

HUBBARD AND COMPANY

PITTSBURGH

Canadian Manufacturers and Distributors: Acme Stamping & Tool Works, Hamilton, Ontario

The war test established the best!



For NEW AND RE-CONSTRUCTION

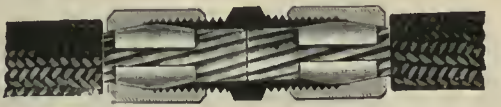
The demands of the reconstruction period from the electrical viewpoint will be for war-tried and proved products.

Most certainly engineering is not going back to the practice of solder days in making connections.

In America's supreme industrial achievement, our plant capacity was completely overwhelmed by the government calls for

DOSSERT SOLDERLESS

Connectors and Terminals



2-Way Connector Showing Details

To help the country to Dossert service we waived our patent rights for a specified war period, now expired. Other manufacturers were thereby enabled to produce for the government solderless connectors embodying the Dossert Tapered Sleeve.

If proving ground were needed to endorse the tapered sleeve principle the record of Dossert Connectors in America's great industries supplies it. **Get Our 15th Year Catalogue.**

DOSSERT & COMPANY

H. B. LOGAN, President **242 West 41st Street, New York**

Install Thermit

For That Neglected Track

During the period of the war, scores of electric railways had to carry so much extra travel that proper track upkeep was practically out of the question.

Again, many other railways were not permitted to borrow money for rehabilitation, no matter how good the returns.

With war-traffic and war-finance restrictions off, you will want to stop racking your riders and your rolling stock at the earliest possible moment.

That means the adoption of the Thermit Insert Weld, the only means of insuring a truly, continuous rail.

Installation records of thousands of Thermit Insert Welds in temperatures from 20 degrees below zero (Youngstown, Ohio) to 122 degrees Fahrenheit (San Antonio, Texas) prove that

Thermit Insert Welds
Make Good at Any Temperature

METAL & THER

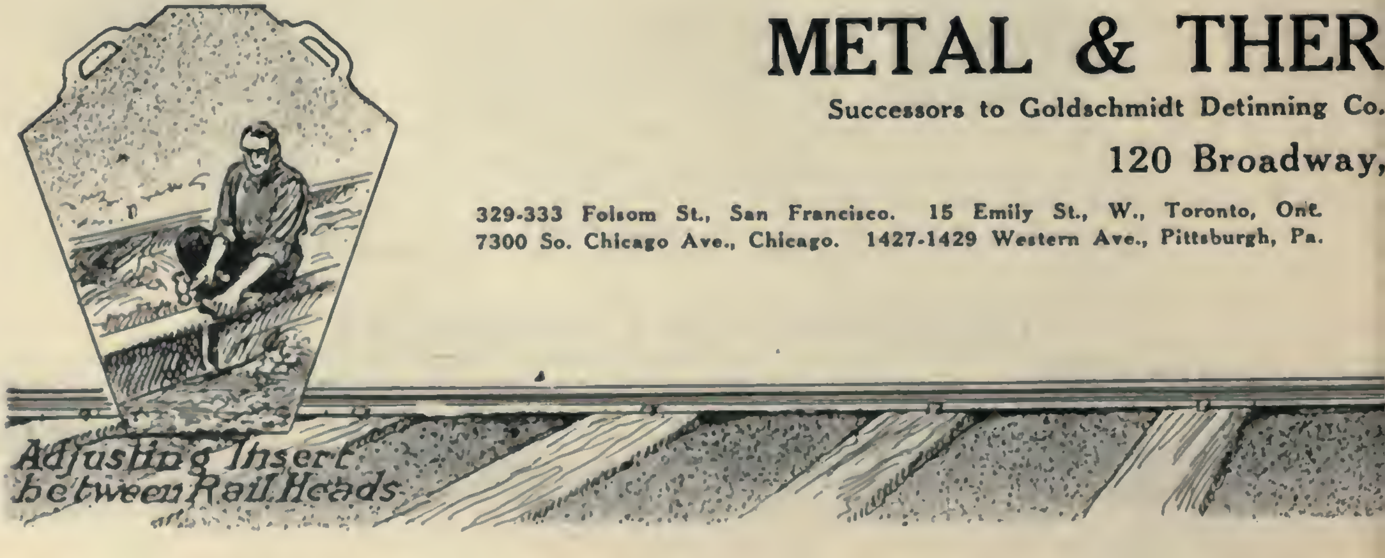
Successors to Goldschmidt Detinning Co.

120 Broadway,

329-333 Folsom St., San Francisco. 15 Emily St., W., Toronto, Ont.
7300 So. Chicago Ave., Chicago. 1427-1429 Western Ave., Pittsburgh, Pa.

Breaking Ground

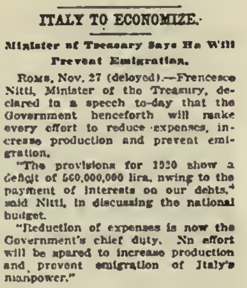
Bringing Up Equipment


Adjusting Insert between Rail Heads

Insert Welds

To Minimize Track Labor Scarcity

Reconstruction requirements in the European countries lately at war and their freer political development plainly indicate that the kind of labor ordinarily used for track and paving is going to remain scarce and expensive. The accompanying note about Italy is typical.



ITALY TO ECONOMIZE.

Minister of Treasury Says He Will Prevent Emigration.

Rome, Nov. 27 (delayed).—Francesco Nitti, Minister of the Treasury, declared in a speech to-day that the Government henceforth will make every effort to reduce expenses, increase production and prevent emigration.

"The provisions for 1920 show a deficit of 560,000,000 lira, owing to the payment of interests on our debts," said Nitti, in discussing the national budget.

"Reduction of expenses is now the Government's chief duty. No effort will be spared to increase production and prevent emigration of Italy's manpower."

It will therefore be necessary for the American way engineer to figure on fewer men but better methods.

In that most critical part of city way maintenance—the rail joint—the labor of remaking joints together with the often more costly repaving can be eliminated only by eliminating the rail joint itself.

Such elimination is obtainable readily by the application of the Thermit Insert Weld. The apparatus that goes to make up a Thermit Insert Weld is extremely simple, while the operation itself has been so standardized that

Thermit Insert Welds
Can Be Made Successfully By Your Own Men

Applying Asbestos and Molosses Strips

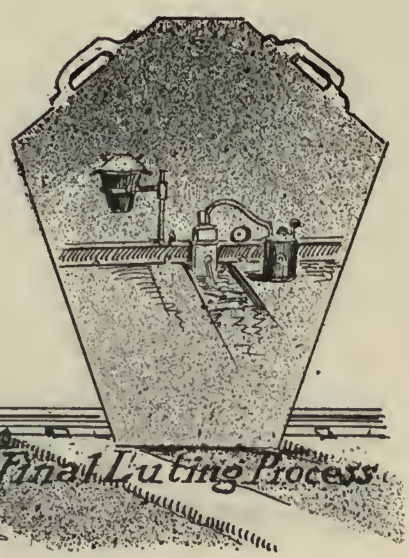
Making Two-Part Molds

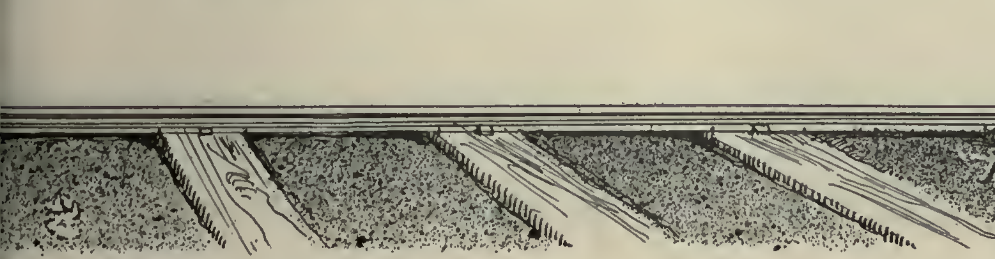
MIT CORPORATION

and the Goldschmidt Thermit Co.

New York

Factories located at Chrome, N. J.; Wyandotte, Mich.; East Chicago, Ind.; Jersey City, N. J.





Install Thermi

To Stop Power Leakage Losses

It is a splendid thing to save coal by adopting light-weight cars.

But that's only a part of the fuel-saving possibilities for an over-weight car can waste power only while it is running, while a poorly bonded joint is allowing power to leak away *continuously*.

The Thermit Insert Weld, as its name implies, eliminates this waste because it furnishes a return circuit whose conductivity is uninterrupted.

This result follows naturally from the complete full-section welding attained with the Thermit Insert Weld —the only weld made by instantaneous chemical action.

And the same process that assures a perfect electrical connection also assures a perfect mechanical connection since

Thermit Insert Welds
Produce an Absolutely Jointless Rail

METAL & THER

Successors to Goldschmidt Detinning Co.

120 Broadway,

329-333 Folsom St., San Francisco.
7300 So. Chicago Ave., Chicago.
15 Emily St., W., Toronto, Ont.
1427-1429 Western Ave., Pittsburgh, Pa.

Adjusting Molds

Heating 4 Joints at Once

Making the Welds

Insert Welds

For Smooth Track and Smooth Relations

Uninterrupted service and smooth riding track are potent factors in maintaining smooth public relations.

Temporary rerouting because battered joints have to be built up again and again; diminished schedule speed and poor lighting due to leakage at joints; and hard riding track because of low joints are as costly to you as they are annoying to your patrons.

These mutual disadvantages can be removed once for all by superseding the costly, complex and obsolete combination of joint plate and copper bond by the use of

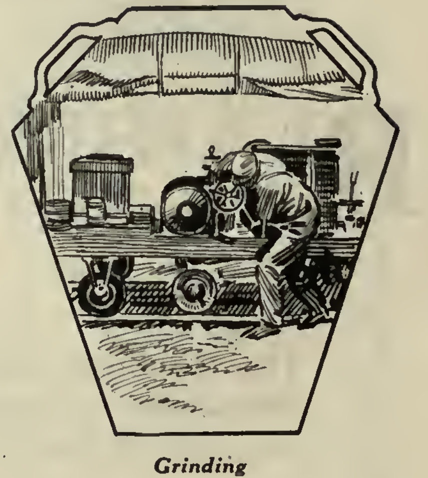
Thermit Insert Welds

which produce a rail of continuous unbroken section with no rail ends to dish and no bonds to shake off, and in short,

Thermit Insert Welds
Produce a Permanently Continuous Rail

MIT CORPORATION
and the Goldschmidt Thermit Co.
New York

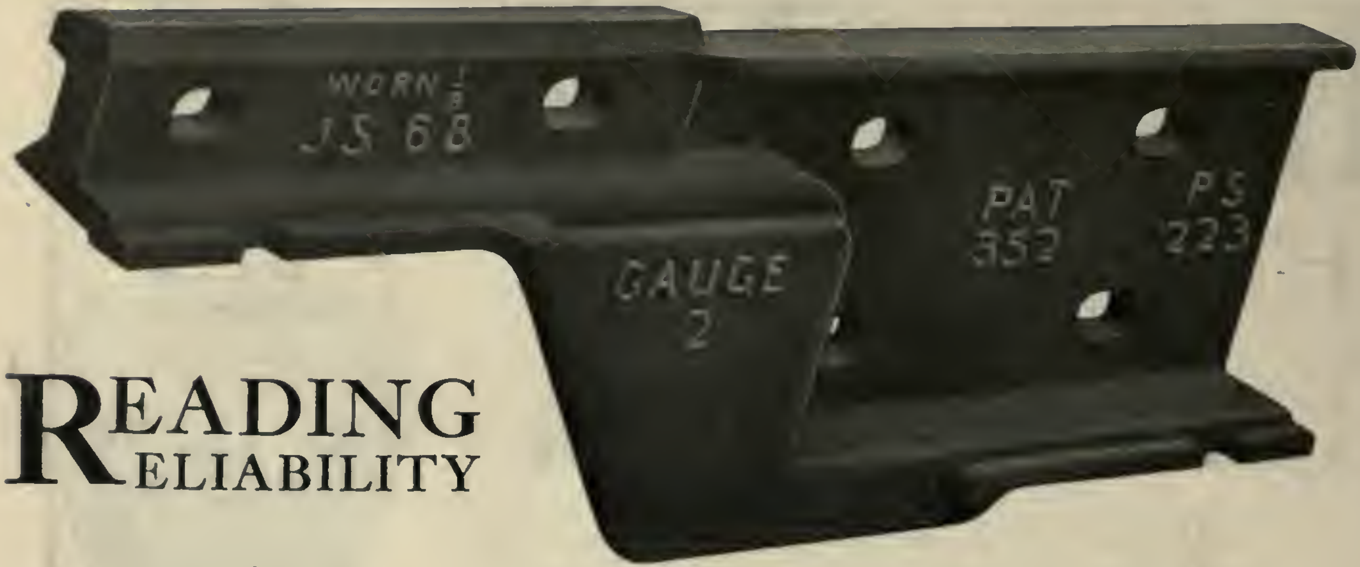
Factories located at Chrome, N. J.; Wyandotte, Mich.;
East Chicago, Ind.; Jersey City, N. J.



Grinding

Replacing Paving

Car Operation Restored



READING RELIABILITY

The reliability that is built into all Reading Specialties shows in the service they give on the job. They handle the work the *right* way and the *quick* way, cuts costs and increases operating efficiency.

Our Compromise Joint for all sections, girder and "T" rails is an example of what we mean by "Reading Reliability." Its reliable service is a *known quantity* to every company using it—and this includes many of the largest and most progressive street railway companies in the country.

The Reading Car Replacer (illustrated below) gets the car back on the rails at the first shot! The cause of most "First trial" failures—the tread of the wheel dropping below the head of the rail—is eliminated with this "sure-shot" replacer. The Reading clamp grips the replacer against the rail and insures replacement on the first trial.

Let us send you *full* information about *all* Reading Specialties—and how they will prove profitable for you.

MANUFACTURED AND SOLD BY

THE READING SPECIALTIES CO.

READING, PA.

Peace Time Economy

The value of *Indianapolis Welded Joints* was well known before the war when normal conditions prevailed, and that value was enhanced manifold during the war.

And now peace has dawned and we are confronted with the innumerable problems of reconstruction. Do recent events detract from the value of welded joints? Emphatically no! Materials going into the construction and maintenance of electric railways did not soar to their present high prices overnight; nor will they return to their old figures in magic fashion. Materials are still scarce, prices still high. As a matter of economy the need for *Indianapolis Joints* and *Portable Electric Welders* has never been greater than right now. They have doubled the life of rails for hundreds of leading railways.

We will gladly furnish complete details.

Indianapolis Switch & Frog Co.
Springfield, Ohio

Showing Installation of 400,000 cm. Flexible Crown Rail Bonds Applied Around the Joint, on Rails of New York City subways.

"CROWN"

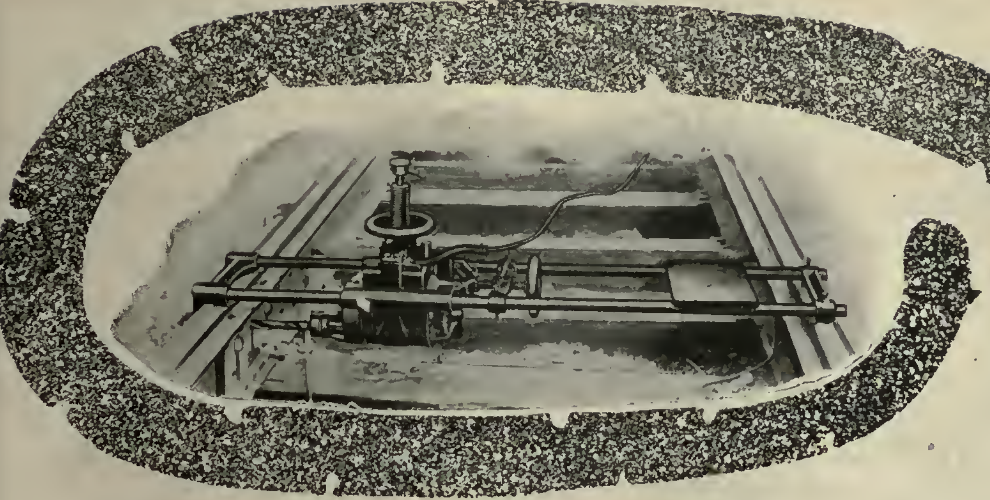
Your rejuvenation program
should include
Crown—United States—
Twin Terminal—Welded

RAIL BONDS

For details, address

**American
Steel & Wire Company**

Chicago
New York
Cleveland
Pittsburgh
Denver
U. S. Steel Products Co.



Little Giant Track Drills

Help You Keep Track Upkeep Down!

This is the Little Giant Track Drill (standard type), built for rapid work in rail bonding, drilling tie and joint holes, and for reaming joint holes. Note that the frame does not *bolt* to the track; it simply *hooks* over the rail to be drilled, the operator holding down the other end by sitting on the seat provided. Other features provide for the quick, simple application and operation of the drill for *any* nature of track drilling work.

These are times for *super* efforts toward labor conservation. You are losing money on every track drilling job you handle without Little Giant Track Drill's aid!

Built in two sizes for maximum drilling of 1 in. and 1½ in. holes. *Ask for literature.*

The Little Giant Track Drill is just one of a *family* of portable electric labor-savers. There are Little Giant Portable Electric Grinders, Portable Electric Spike Drivers, Portable Electric Hammer Drills, etc. Write for complete illustrated Bulletins.

Chicago Pneumatic Tool Co.
1062 Fisher Bldg.,
Chicago, Ill.

Five Little Giant Electric Track Drills reaming joint holes on the tracks of the Pittsburgh Railways Co. These five are part of a big battery of Little Giant Portable Electric Tools, saving time, labor and money for this prominent user.

Fifteen Millions of Dollars for Track Replacement in 1917

That, according to authoritative estimate, was the size of the bill which the electric railway industry in the U. S. and Canada had to pay in 1917 for replacing only 375.4 miles of presumably old, worn-out, no longer usable track.

There is, of course, no data to show the facts, but it would certainly be interesting to know how much of this expenditure might have been saved by *repairing* instead of *replacing* the track structure and making the old rails as good as new by the use of

RECIPROCATING TRACK GRINDERS

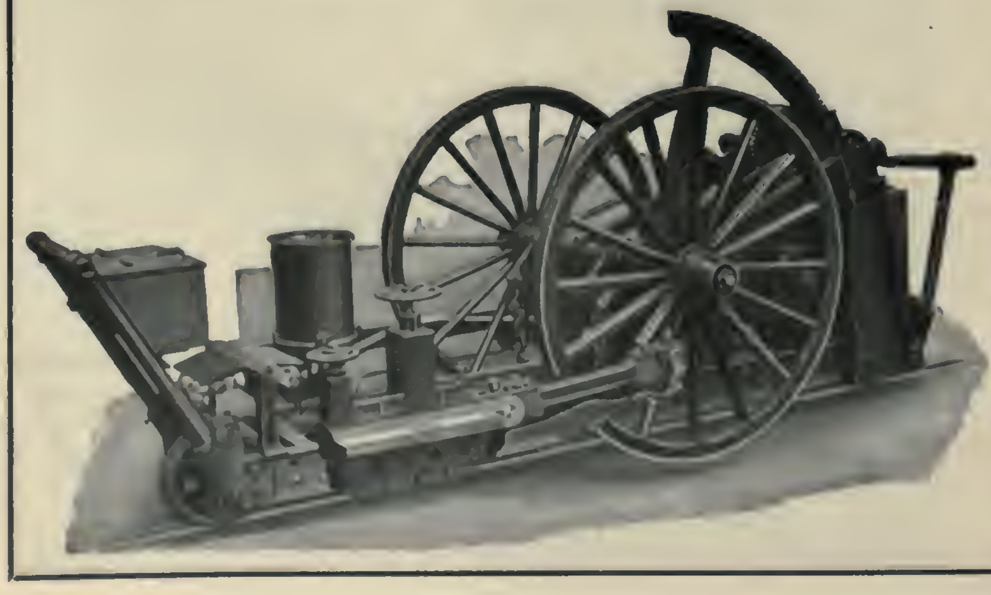
All at a fraction of the amount spent for complete replacement.

Enormous savings have been made in just that manner by companies having stretches of track which appeared to be hopeless for further use.

It would be still more interesting and profitable as a demonstration of the value of economical track grinding to know how many *more* years of useful life *all* of this track might have had if Reciprocating Grinders had been put to work on it several years ago and the consequent strain and wear on track structure and rails had been prevented by keeping rails constantly smooth and level.

More than a hundred railways throughout the world have demonstrated the immediate and eventual economies resulting from the use of Reciprocating Grinders.

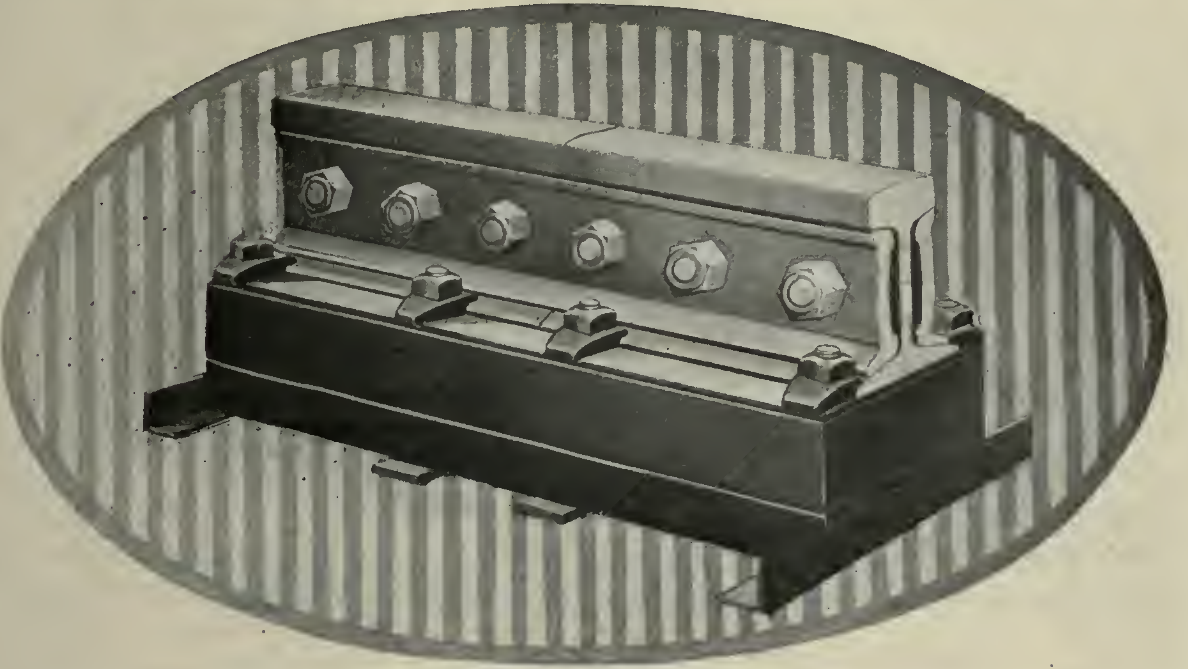
We are ready to prove these same values to you on your own tracks without any expense to you.



Railway
Track - work
Company
30th and Walnut Sts.
Philadelphia

Agents:
HOLDEN & WHITE, Inc.
343 S. Dearborn Street
Chicago

The MECHANICAL RAILWAY TIE



Rectify Low Joints Without Interrupting Schedules By Using the Dayton Rail Joint Booster

The Dayton Rail Joint Booster, described in our last advertisement in Electric Railway Journal and illustrated herewith, automatically and quickly corrects low joints and uneven rail ends.

Its installation is exceedingly simple:

The pavement and superstructure immediately surrounding the low joint which is to be repaired, to a depth of 13 or 14 inches below the rail base is removed and the old joint tie is cut in two and the part supporting the joint is taken out and replaced with the Joint Booster. The Joint Booster is clamped in place on the rail base and welded its full length to the rail. The rail is jacked up until the base is at the correct level and the trench beneath the Booster is then filled with only slightly damp concrete. After the concrete has been thoroughly tamped and retained under the booster the trench is left open for a few hours to make sure that passing cars do not disturb the concrete. The old angle bars are welded to the rail and the bolts are spot welded.

After the concrete has set, the trench refilled and the pavement repaired, the cupped ends of the rails are built up and ground to surface by means of the well-known process now in general use.

Order One for Trial and Be Convinced

THE DAYTON MECHANICAL TIE CO.
201 Third Street Arcade
DAYTON, OHIO

The Abbott Rail-Joint Plate
"Built like a bridge"

THE Abbott Plate supports the wheel load and transmits it to the two joint ties as completely and in the same manner as a short deck bridge puts load upon its piers. In other words, the splice bars are practically relieved of other duty than overcoming lateral thrust and maintaining lateral alignment, while the Abbott Plate *unfailingly* holds the track surface up to the right level for smooth running.

This reinforcement against vertical thrust eliminates the worst cause of worn, bent and broken bars, stretched bolts, loosened nuts and battered rail ends, and adds greatly to safety.

Other features of the Abbott Plate, too numerous to mention here, make the installation pay for itself the first year and provide otherwise unobtainable benefits. You can't be well posted on track safety and economy until thoroughly familiar with the facts. Ask us for figures and proof.

Ask for our booklet "Improved Track Appliances."

287

Lackawanna Steel Company
LACKAWANNA, N. Y.

ATLANTA
BOSTON
BUFFALO
CHICAGO
PHILADELPHIA
ST. LOUIS
CINCINNATI
CLEVELAND
DETROIT
NEW YORK
SAN FRANCISCO
HAVANA

"Ship Turbo Gear P. D. Q."

The Arrow Shows the Turbo-Gear

TURBOGEAR

FAST PATENTS

Right, sir! We can soon take care of your rush orders. During the war the Government commandeered over 95% of our manufacturing facilities.

Now it has given back our plant and workmen to a very large extent, and we can make more prompt deliveries for power plant work.

We realize, of course, that the reason you want prompt deliveries of the Turbo Gear is that no other speed transforming device on the market works so efficiently (over 98% of the power is transmitted) or within such a small space.

You have our Bulletin 213, of course?

Turbo Gear Steps Speed Either Up or Down.

The Poole Engineering & Machine Company

Manufacturers of Gears and Power Transmission Machinery Since 1843

Baltimore, Maryland, U. S. A.

CHARLOTTE, N. C. .... Realty Bldg.
CHICAGO .... Old Colony Bldg.
DALLAS .... 1405 Southwestern Life Bldg.
DENVER .... First National Bank Bldg.
DETROIT .... 423 Dime Bank Bldg.
EL PASO .... 615 Mills Bldg.
MILWAUKEE .... Wells Bldg.
NEW YORK .... 50 Church St.
PHILADELPHIA .... 929 Chestnut St.
PITTSBURGH .... 781 Union Arcade Bldg.
ST. LOUIS .... 2211 Olive St.
SALT LAKE CITY .... 218 Judge Bldg.
SAN FRANCISCO .... 503 Mission St.
SEATTLE .... 2012 L. C. Smith Bldg.

Canadian Representatives:
Engineering Company of Canada .... Montreal

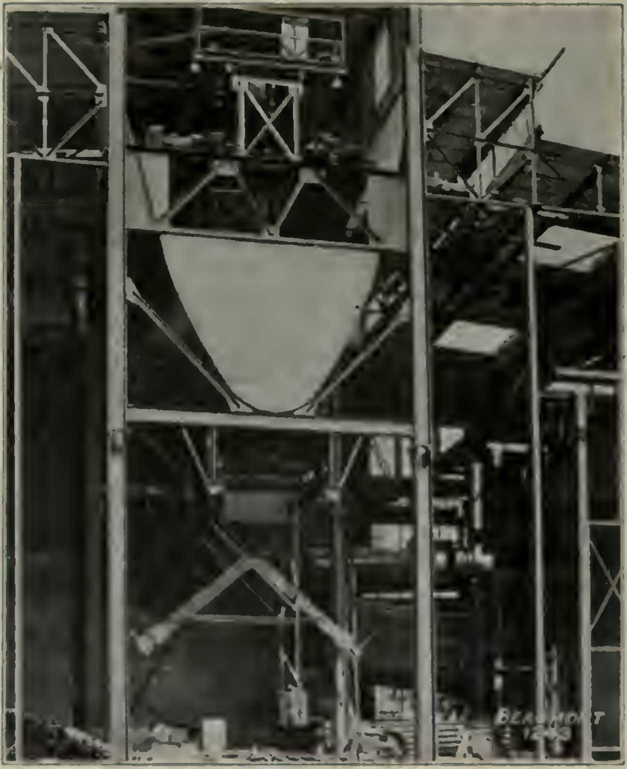
Beaumont
ONE CONTRACT
ONE RESPONSIBILITY

Now is the Golden Opportunity

for Electric Railway Officials to lay out a definite and comprehensive rejuvenation program, to make up for the enforced "run down" condition of the road —to get *at the heart* of the problem with

Increased Efficiency in

Coal and Ashes Handling



Philadelphia Suburban Gas & Electric Co., Cromby, Pa.

Suspension Bunker, feeding by weigh-larry to boilers. Skip Hoist and Bunker for ashes, fed by dump car from ash hoppers.

So successful have we been with the "divorced system" of coal and ashes handling in prominent power houses that we are CERTAIN we can play an important and profitable part in *your* rehabilitation. The fruits of our 25 year specialization in this field are yours to gather.

Write for Catalog No. 33

R. H. BEAUMONT CO.

319 Arch St., Philadelphia

New York **Boston** **Chicago**

Don't
Let Clinkers Freeze to the Sidewalls!

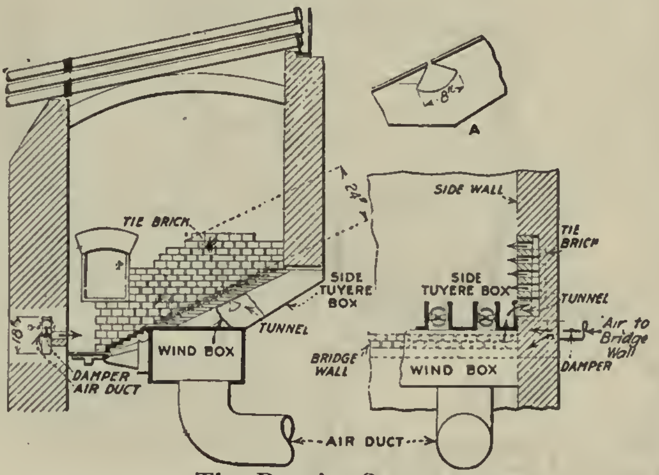
Wherever intense fires are maintained the coal will naturally slag down into clinkers. The clinkers will adhere to the sides of the furnace walls, and, fusing with the brick in large masses, extend over the grate and prevent the proper combustion of the adjacent coal. To break out such clinkers usually requires the dumping of the fire, and the use of heavy sledge-hammers and slice-bars, with the consequent damage to the sidewalls.

The Bernitz Method Prevents It

by arranging the bricks in the sidewalls and bridge walls in such a way as to allow a current of air to play around the bricks where they come into contact with the fire-bed, and by thus keeping them below the fusing point, prevent the clinkers "freezing" to the walls.

What is the Bernitz Method?

The Bernitz Method is a method of furnace wall construction of fire brick, having an air passageway inclosed in said wall, immediately back of the face brick, forming the furnace face which is directly in contact with the fuel in the furnace, and air passages opening from said inclosed passageway through the furnace face into the fuel, whereby a constant supply of air around the face brick in contact with the fuel bed, is provided.



The Bernitz System
as applied to a Taylor Stoker Installation

The Bernitz Invention is Licensed, Not Sold;

The Bernitz Method has received patent protection in the United States and foreign countries, and licenses, under its patents, both issued and allowed, are now being granted on the basis of the H. P. rating of the boilers under which the Method is installed.

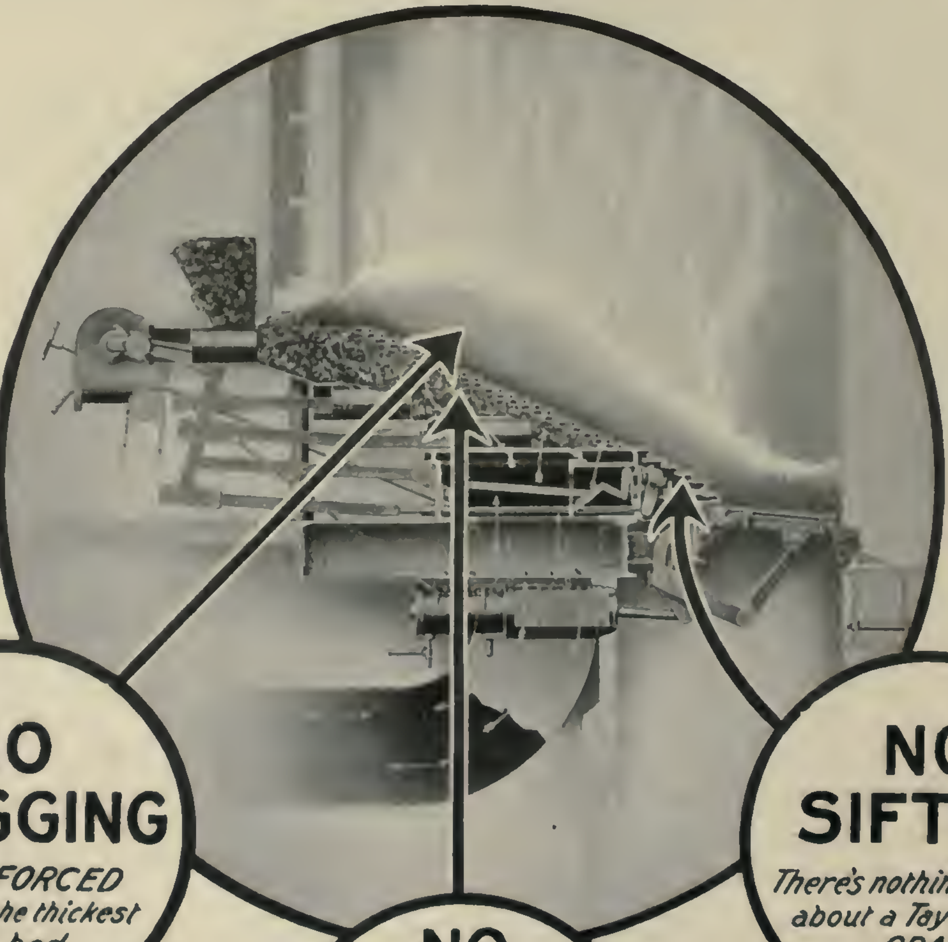
All infringers of these basic patents will be vigorously prosecuted.

Write for full particulars to

BERNITZ METHOD COMPANY
506-507 Tremont Building
Boston, Mass.

Introducing the

to the advertising



NO CLOGGING

Air is FORCED through the thickest fuel bed

NO BLOWING AWAY

All coal must pass up THROUGH the hottest part of the fuel bed

NO SIFTING

There's nothing sieve-like about a Taylor Stoker GRATE

Here is a profile of Taylor Stoker Type BA, with Power Dump. Note the deep fuel bed. The draft and feed are so synchronized to the class of fuel that even BONE is burned at high efficiency, and the clinkers that do form *can't clog the grates or prevent adequate air supply.* Moreover, the clinkers are removed *instantly* by the Taylor Power Dump.

From 18% to 20% CO_2 represents *perfect combustion.* Taylor Stokers maintained 16.13 with Pittsburgh No. 8 Slack in one plant—15.05, later test, same fuel, same plant—14.19 with Illinois Bituminous Screenings at Kewanee—13.33 with Illinois Slack—14.2 with Iowa Lekonta District Slack—just verify these figures and dozens more in our "Fuel Burning Reports No. 1." Get a copy.

The TAYLOR System of Efficient Boiler Firing

Taylor Stoker

pages of this Journal

To you Electric Railway Executives whose power-plants are not yet Taylor-Stokered, our advertising will point the way to greater fuel economy — increased plant efficiency — maximum power dependability.

We will show you how Taylor Stokers enable you to burn cheap, low-grade coal—bone—slack—culm—with *high efficiency.*

We will demonstrate how Taylor Stokers easily meet quick load changes and high overloads even with this cheap coal.

We will show you how Taylor Stokers make one or two firemen equal about TEN men handfiring.

We will take you into Taylor-Stokered Electric Railway Power Plants.

We will *prove* that the Taylor Stoker is indispensable in the face of the uncertain conditions and difficulties that confront one of America's most important industries — electric railway transportation.

Watch Taylor Stoker advertising!

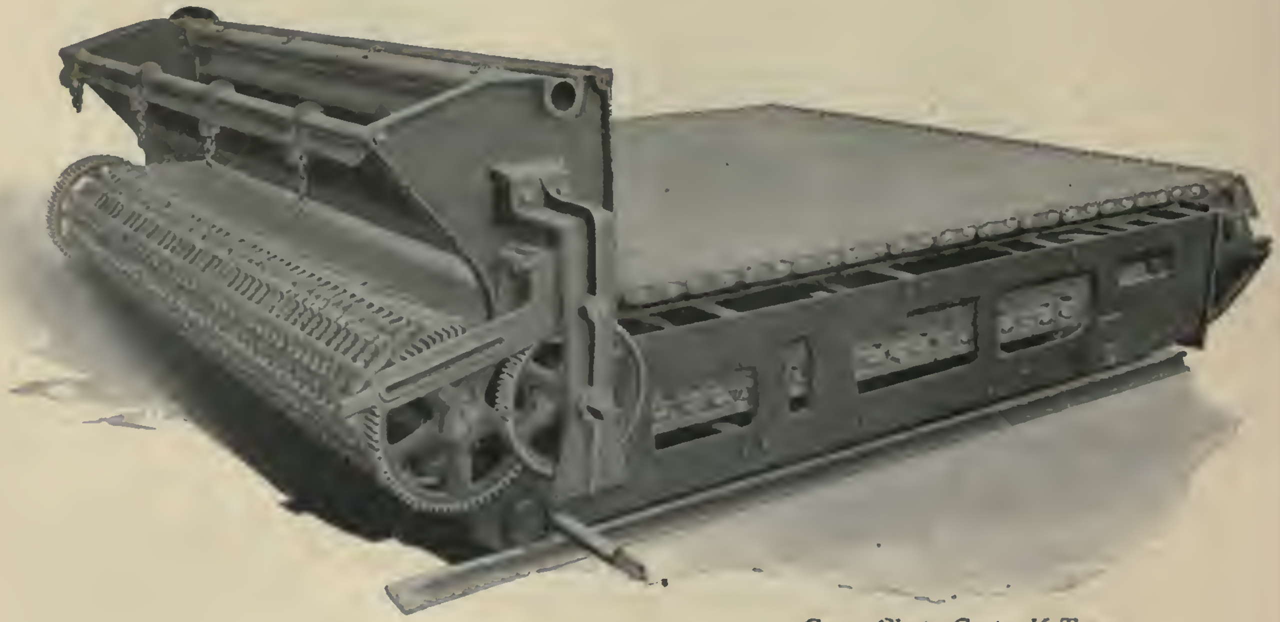
AMERICAN ENGINEERING COMPANY
PHILADELPHIA

Foreign Licensee: Babcock & Wilcox, Ltd., Oriel House, Farringdon Street, London, England.

The Taylor Stoker

Behind a Million and a

Where Green Chain Grates are made—the shops and foundries of the Green Engineering Company at East Chicago, Indiana.



Green Chain Grate, K Type.

Backed by 21 Years of Specialized Experience

Green Sealflex Arch
Green Pressure Water Backs
Green Steam Jet Ash Conveyors
Green Materials Transfer and Storage Hopper

GREEN

Half Boiler Horse Power —Green Chain Grates

Behind Green Chain Grates—21 Years of Experience in the Specialized Field of Combustion

EVER since hand firing gave way to stoker firing—during the years that embrace the progress and development of combustion engineering—Green Chain Grates have played a conspicuous part in making possible the fuel economy, the saving of labor and the increased capacity of the ideal power plant of today.

Even twenty-one years ago the Green Chain Grate embodied all that could be desired in a mechanical stoker. It saved labor. It economized fuel. It increased boiler capacity. All this, because it fed the fuel, burned the fuel, discharged the ash and automatically cleared the air spaces of the grate surface.

And these *inherent* operating advantages have been *heightened* by the development of combustion engineering. Green Engineers, with their advantages of extensive organization and broad experience, have been natural leaders during this period of revolutionary development.

That is why thousands of modern Green installations owe such a large part of their success to the specialized experience of Green Engineers for almost a quarter century.

Green Engineering Company

Main Office and Shops:
East Chicago, Indiana

Singer Bldg., New York.
425 Guardian Bldg., Cleveland, Ohio.
1101 State Life Bldg., Indianapolis, Ind.
Oliver Bldg., Pittsburg, Pa.

14 East Jackson Blvd., Chicago, Ill.
1984 Railway Exchange Bldg., St. Louis, Mo.
Tramway Bldg., Denver, Colo.

Representatives in Canada
Kipp-Kelly-Brown, Ltd.,
Winnipeg, Can.

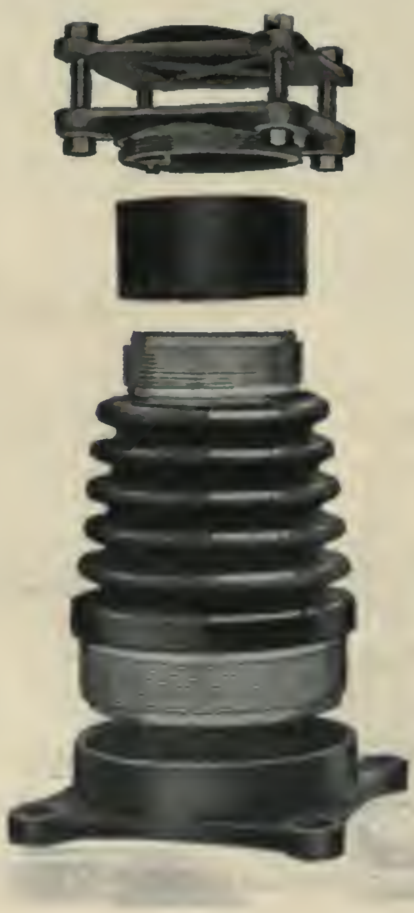
CHAIN GRATES

"K" Type for Clinkering Coals "L" Type for Coking Coals

"Install the 'Franklin' and Forget It"

Metal Bushings Die-Cast on the Porcelain

of "FRANKLIN" Bus Bar supports, do away with clamped or cemented fittings. By their intimate contact with every part of the porcelain's circumference, these bushings ensure an equal distribution of strains. As compared with the spot-strains caused by clamped fittings, this equal distribution increases many times over the strain-resisting capacity of the Bus Bar Supports.



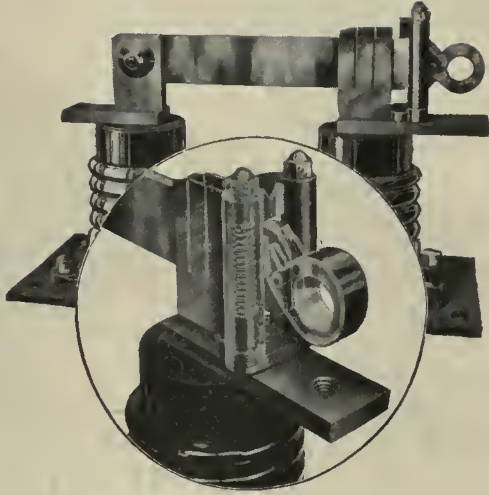
YOU *do* forget a "FRANKLIN" device as soon as it is installed. You forget it just as you forget the bricks or the concrete in the walls of your plant—because you *know* it won't fail you.

It isn't a matter of confidence alone; it is certainty.

For "FRANKLIN" Generating Station Equipment is designed and built not merely with a view to ordinary operating conditions but to withstand any conceivable extra strain that can be put upon it.

Note the details of the "FRANKLIN" Bus Bar Sup-

INSTALL THE "FRANKLIN" AND FORGET IT!
ELECTRICAL DEVELOPMENT AND MACHINE CO.
TRADE MARK
GENERATING STATION EQUIPMENT



The Closed Bridge above the Switch-Blade,

formed by the brass lock-jaws, prevents the opening of the "FRANKLIN" Switch-Lock by electrical expulsion strains.

By the rotating action of the cams on the pull ring against the lugs on the lock-posts, a single easy pull with any hook swings open the jaws and permits the blade to pass out.

All parts are rugged and all joints rigid. The "FRANKLIN" Positive Lock is incorporated only in the "FRANKLIN" Disconnecting Switch.

port and the "FRANKLIN" Positive Switch-Lock illustrated here. The same attention to every detail of design and construction is characteristic of all "FRANKLIN" Products.

There are two ways to satisfy yourself of the character of "FRANKLIN" Devices — by their record in service and by critical inspection. Their superiority is unmistakable at sight.

For present or future reference, write today for descriptive bulletins.

SELLING AGENTS
THE PHILADELPHIA ELECTRIC
COMPANY SUPPLY DEPT.
132 South Eleventh Street,
Philadelphia.

"FRANKLIN"

GENERATING STATION EQUIPMENT

Disconnecting Switches
Insulators Potheads
Compartment Doors, etc.

What is more business worth to you if you lose it overnight?

You dig and drive and sweat blood to exceed last year's record. More business. Greater production. More! *More!* MORE! all the time. Your very life goes into this increase.

Is it fully protected?

Look to your fire extinguishers. Are they empty? Then you are flirting with disaster. Nine times out of ten it is just sheer carelessness. But oh, how costly! There is economy in more ways than one in the use of

CASTLE LIQUID

JAMES M. CASTLE, INC.

The Universal Liquid for Refilling One Quart Extinguishers of the Carbon Tetrachloride Type

BECAUSE CASTLE LIQUID is the only liquid that is recommended for use in ALL one-quart extinguishers of the carbon tetrachloride type. All other refill liquids are recommended for one particular make of extinguisher only; use CASTLE LIQUID in any one-quart extinguisher and secure maximum efficiency.

BECAUSE CASTLE LIQUID enables you to keep your stock down to a minimum. If you have four or five different makes of one-quart extinguishers in your property use CASTLE LIQUID for them all.

BECAUSE CASTLE LIQUID contains no chloroform, it is therefore safer to use. Chloroform in the hands of a skilled practitioner is not dangerous. Its use in an extinguisher recommended for confined area is questionable. Nearly all other refill liquids contain chloroform.

BECAUSE CASTLE LIQUID is non-damaging and has the required low freezing point; because CASTLE LIQUID is LESS corrosive and has HIGHER electrical resistance than those liquids containing chloroform.

BECAUSE CASTLE LIQUID is not an experiment. It is used by hundreds of the largest corporations all over the country. It marks the first real improvement in fire extinguishing liquids of this class.

You can make a real saving in your plant by using CASTLE LIQUID.

Write for YOUR prices and our interesting illustrated booklet containing information of great value to you about fire extinguishing liquids. It will certainly save you money; possibly your plant.

JAMES M. CASTLE, Inc.
Lincoln Building, Philadelphia

Manufacturers and Distributors of
One-quart Fire Extinguishers *Three-gallon Soda Extinguishers* *Chemical Fire Engines*
Motor Driven Fire Apparatus *Underwriters' Fire Hose*

NILES CRANES

For Power House, Repair Shop and General Use

Built in capacities of 5 tons and upwards, Niles Electric Traveling Cranes have an exceptionally wide application in the electric railway field.

The larger capacity cranes—which range in size up to 250 tons or still larger—permit the handling of the enormously heavy, costly power plant equipment with ease and safety.

The smaller-sized cranes, which can be arranged to be operated from cage or by pendant cords from the floor, have a more universal use in handling machine and car parts, quickly and easily. They are potent factors in speeding up and lightening work in the repair shop.

Quietness, safety and efficiency in operation, and unusual freedom from maintenance and repair costs are desirable features which distinguish Niles Cranes.

We are justly proud of our dynamic braking system which is supplied if desired. It eliminates the mechanical load brake and its friction and at the same time ensures perfect regulation, safety and absolute control of the load in hoisting and lowering.

Special Repair Shop Equipment

Coincident with our development of special tool equipment for railroad and locomotive building and repair shops has been the production of a number of high-speed machine tools for electric railway repair work.

These include—Car Wheel Lathes, Hydraulic Wheel Presses, Axle Lathes, Car Wheel Boring Machines, as well as Steam Forge Hammers, Engine Lathes, Boring and Turning Mills, Slotters, Planers, Drills and other general machine tools.

May we send you our catalogues?

NILES-BEMENT-POND CO.

GENERAL OFFICES, 111 BROADWAY, NEW YORK

Boston
Philadelphia
Birmingham, Ala.

Pittsburgh
Hamilton, Ohio
Cincinnati

Cleveland
Detroit
Chicago

St. Louis
San Francisco
London, England

For Canada—John Bertram & Sons Co., Ltd.,
Dundas Montreal Toronto Winnipeg
Vancouver

Peace should bring no relaxation of your efforts toward economy

Frankly speaking, the outlook for the Electric Railways is not much, if any, bettered by the return of peace. True, the future warrants optimism—but at the same time it calls for the most energetic measures to bring neglected equipment up to the point of greatest efficiency. Among the best investments that your railway can make is

Irvington
Black Varnished Cambric

for insulating purposes. This material—as well as other Irvington insulating products—truly accomplishes what this Journal describes as "making every maintenance dollar give 100 cents' worth of work."

Irvington Insulation will assure high resistance and high dielectric strength. It is non-hygroscopic, chemically neutral and heat-resisting.

We manufacture oiled silk, varnished cambric, flexible varnished tubing, special paper for coil windings.

No one knows when the price of materials and labor will go back to normal. The wisest thing to do is to get the *best*—for the greatest *service*.

IRVINGTON VARNISH & INSULATOR Co.
Irvington, New Jersey.

Toledo Cranes

Picture this Shop Without a Toledo!

Can you imagine what it would cost in time, money, and labor to handle this variety of equipment—without a Toledo?

The Cleveland Railway felt the same way about it—and about Toledo superiority.

Hence, after investigation, on a strictly merit basis, they purchased the Toledo *and they are mighty glad they did so.*

Let us prove to you, not only the desirability of Crane service, but the imperativeness of TOLEDO Service.

The Toledo Bridge & Crane Co.
Toledo, Ohio

New York Office, 52 Broadway
Philadelphia Office, 2013 Market St.
Pittsburgh Office, 203 Oliver Bldg.

Cleveland Office, 725 Citizens Bldg.
Chicago Office, 549 Washington Blvd.
San Francisco Office, Rialto Bldg

Resolve to Run You

DURA

Why

have these electric railways—city, suburban, interurban — installed Duraduct conduit for car wiring?:

Boston Elevated Railway.
Philadelphia Rapid Transit Company.
Virginia Railway & Power Company.
New York State Railways, Syracuse Lines.
Houston Electric Company.
Tampa Electric Company.
Columbus Railroad.
El Paso Electric Company.
Northern Texas Traction Company.
Tacoma Railway & Power Company.
Puget Sound Traction, Light & Power Co.
Nashville Railway & Light Company.

Chicago, South Bend & Northern Indiana.
Fonda, Johnstown & Gloversville R. R.
Altoona & Logan Valley Electric Ry. Co.
Bay State Street Railway Co.
Chicago, Milwaukee & St. Paul Ry. Co.
Indiana Railway & Light Co.
Lewiston, Augusta & Waterville St. Ry.
The Northwestern Ohio Railway & Power Co.
The Penna. R. R. Co.
The Shore Line Electric Ry. Co.
Louisville & So. Indiana Ry.

Duraduct is Durable Duct

TUBULAR WOVEN FABRIC COMPANY
MANUFACTURERS • PAWTUCKET • R. I.
A. HALL BERRY • GENERAL SALES AGENT
71-73 Murray Street, New York 9 So. Clinton Street, Chicago
WENDELL & MACDUFFIE CO. 61 Broadway, New York City
Distributors for all foreign countries except Canada
Northern Electric Company, Limited: Distributors for Canada

Car Wiring Only in DUCT

Because

DURADUCT is far more resistant to flame, water, abrasion and torsion than CANVAS.

DURADUCT is less expensive and more adaptable than RUBBER.

DURADUCT is much lighter than metal or hard FIBRE.

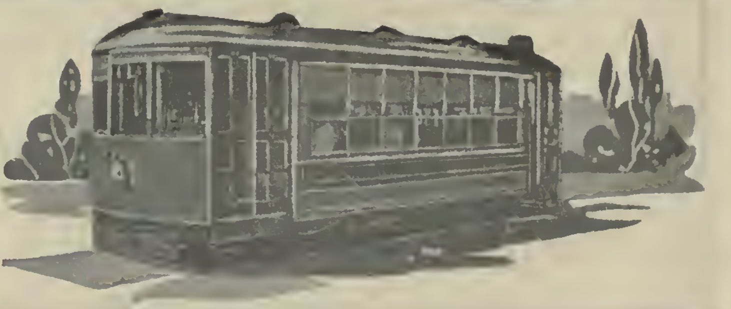
DURADUCT weighs only one-ninth of pipe conduit and is therefore a POWER-SAVER.

DURADUCT can be installed by one man without bending appliance of any kind and is therefore a LABOR-SAVER.

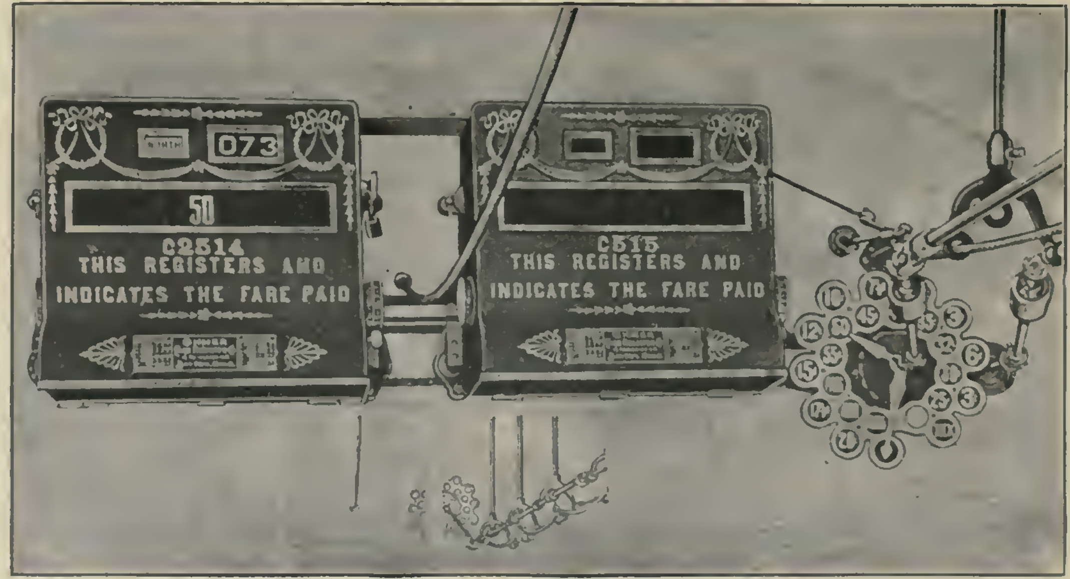
DURADUCT is made for UNIVERSAL application, being as useful for sleeving a motor lead as for encasing main control cables.

—Write for Sample

TUBULAR WOVEN FABRIC COMPANY
MANUFACTURERS • PAWTUCKET • R. I.
A. HALL BERRY • GENERAL SALES AGENT
71-73 Murray Street, New York 9 So. Clinton Street, Chicago
WENDELL & MACDUFFIE CO., 61 Broadway, New York City
Distributors for all foreign countries except Canada
Northern Electric Company, Limited, Distributors for Canada



The OHMER
Twin Register Combination



THE flexibility of the Ohmer System of fare accounting is well demonstrated by the Ohmer Twin Register Combination which is finding special favor just now among the interurbans.

The combination consists of two Ohmer Fare Registers installed on a special double operating device. Each fare is clearly indicated and a full printed report of the business done in each car is produced even though the number of denominations is more than double the normal capacity of one register. The result is accomplished by using each register singly to its full capacity and then combining the registrations of the two machines in such a way as to greatly increase the number of fare denominations which can be handled.

The illustration shows two No. 4 Ohmer Fare Registers in the combination. Registers of this type may be mounted so that it is possible to record fares from 5 cents to $5.95 in steps of 5 cents or 1 cent to $1.19 in steps of 1 cent.

When No. 14 Type Ohmer Registers are used, the capacity of the combination is 5 cents to $6.95 in steps of 5 cents, or 1 cent to $1.39 in penny multiples.

A reasonable number of non-cash denominations, such as ticket, pass, etc., can be handled without reducing the number of cash denominations. Let us give you more information about the "Twins."

Have you a fare collection problem of any kind which worries you? Let us have full particulars. Out of our experience we can help you. You will be under no obligation.

OHMER FARE REGISTER CO.

Dayton, Ohio

Sell Transportation by the Mile

This is the only equitable basis. The Bonham Traffic Recorder will automatically compute and record both the mileage and fare. It will at the same time indicate and record where the passenger boarded the car and the destination. Such a record of traffic makes discussions with railway commissions simple and convincing; for you have all the facts.

With such information before you, your road is operated with full knowledge of sources or revenue as well as those of loss. No guesswork! These are poor times to guess.

Adopt the

BONHAM TRAFFIC RECORDER

and KNOW

Ask for our new bulletin.

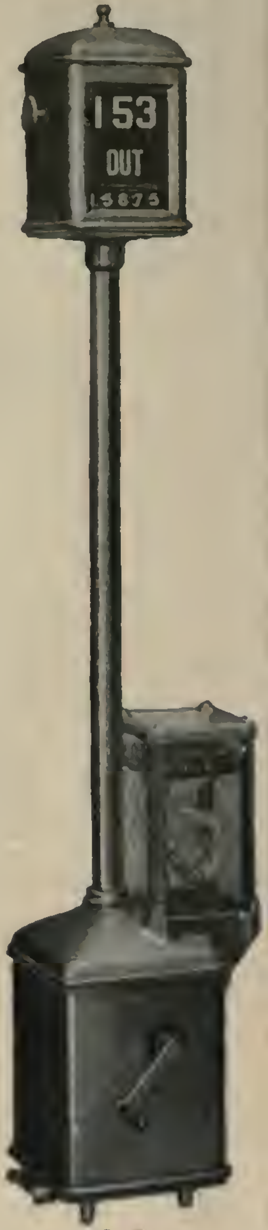
The Bonham Recorder Company, Hamilton, Ohio

THE WAR IS OVER

Our Increased Facilities and Our Entire Efforts Can Now Be Devoted To

YOUR NEEDS—

Type C17 Coin and Metal Ticket Fare Box

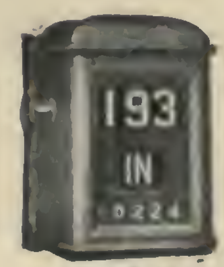


Shortly after the United States entered the war, the International Register Company, believing its first duty was to support the government in every way in its power and thus help win the war, sought opportunity for so doing.

As a result thereof, it was entrusted by the Navy and War Departments with commissions for developing and manufacturing special instruments of various kinds of vital need as equipment for airplanes used by both Army and Navy. Our equipment was nearly doubled by the purchase and installation of new machines of various kinds of the latest and best designs. A double shift was put on, and in the case of one department, three shifts, and every effort made to furnish the instruments needed promptly and in quantities. Accomplishment of this end for the government was the result of our efforts. Our output was multiplied many times and of it all more than 92 per cent was furnished to the government direct.

During this time we used our best efforts under the emergency to care for the needs of our street railway friends with the men and machines available, and we greatly appreciate the patience and consideration given us. About one-half of our output that was not for the government direct was used to furnish equipment on government priority orders for car lines reaching shipyards, camps or factories engaged in war work.

The cancellation by the government of most of our unfilled contracts has released a large part of our productive capacity for use in clearing up the large accumulation of orders for Coin Registers, Fare Boxes, Standard Registers and Fittings, and has placed us in position, with our greatly increased facilities, to make very prompt deliveries of our regular products.



Type R-10 Single Register

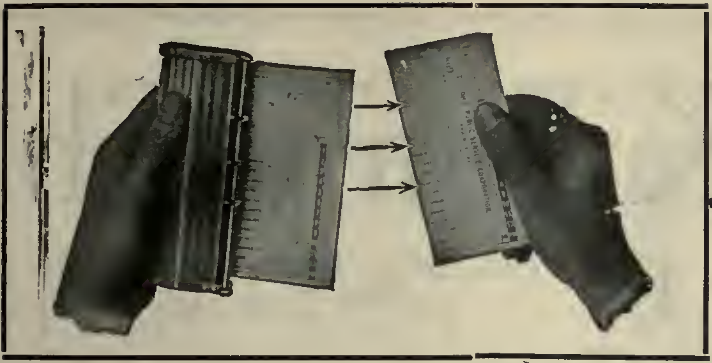
C-15 Coin Register

The changes in fare rates now being made are creating many new problems for electric railway companies. Can we not, with our extended experience and splendid facilities, help you in the solution of your fare collection and registration problems?

THE INTERNATIONAL REGISTER CO.

Manufacturers of Coin Registers, Fare Boxes,
Fare Registers, Street Railway Fittings.
Exclusive Agents for Heeren Enamel Badges

15 S. Throop Street, CHICAGO, ILL.

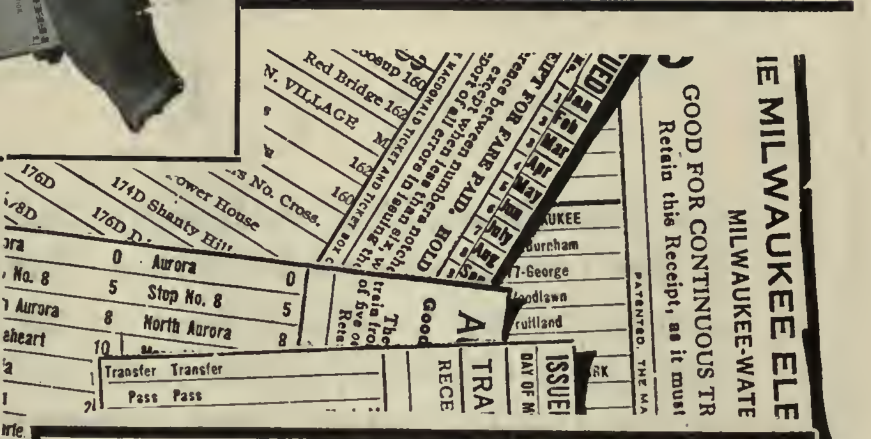


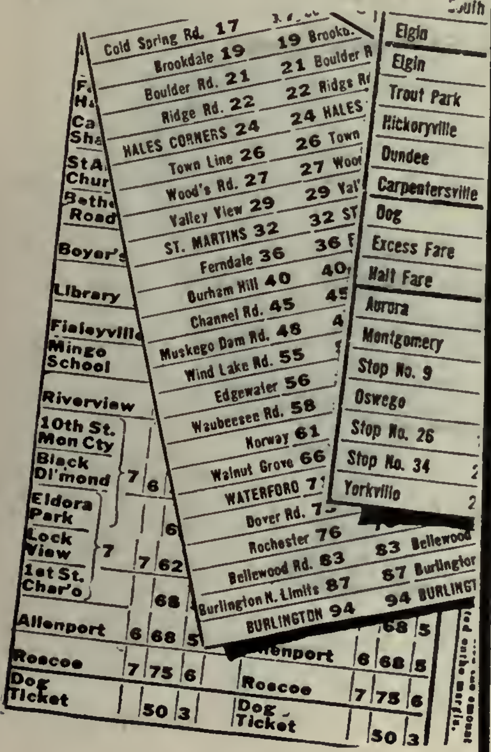
Protect Passengers, Conductors, Road and Country

Anything that will save your conductor's time means a better, safer road; more earnings, more profits more safety, greater satisfaction.

The Macdonald Cash Receipt Holder saves time, for it is instantaneous in action; saves money, for it records every cash fare, saves disputes, for it gives passengers a receipt showing full amount paid, and is indispensable for rendering a correct tax report.

We have heard a thousand things in favor of the Macdonald; never one against it.





Your road needs every penny of revenue for rehabilitation investment

Money must be had to spend on physical equipment if your road is to recover from the practically "non-maintenance" period of the war. The

Macdonald Ticket and Ticket Box System

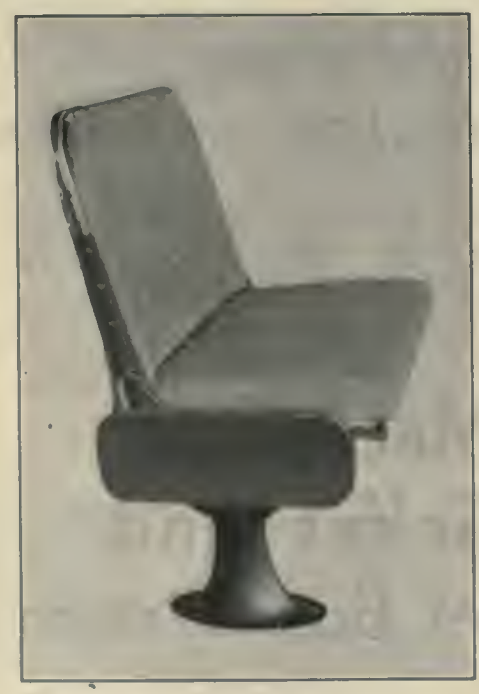
insures this. It is one of the biggest single steps you can take toward an adequate check on *every cash fare.* It is in use on many roads and we have still to hear a complaint regarding it. Better take the matter up with us today and let us "show you." Send for a free sample holder as above illustrated.

The Macdonald Ticket & Ticket Box Co.
Cleveland, Ohio

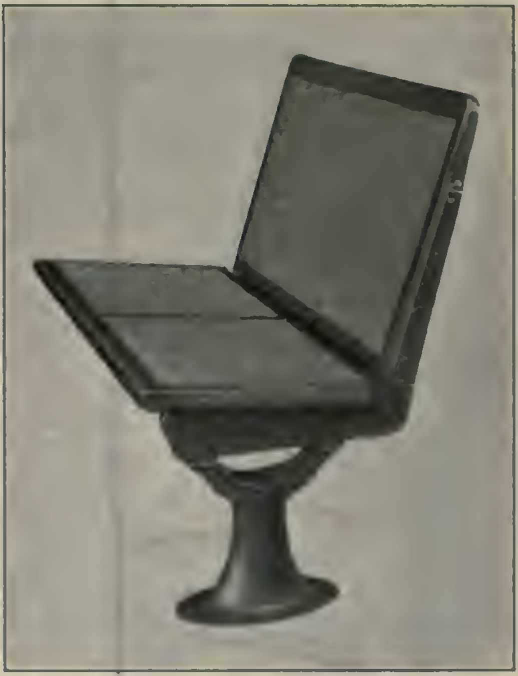
Hale & Kilburn Cha

[*The Unmatchable Hale & Kilburn Steel Seat*
Every Safety Car should

For generations, Hale & Kilburn Seating has been subject to the critical judgment of the Railways, and has been specified, bought and used all over the world. This trademark is just as likely to be found in Japan or Australia, as in the United States. Such a record implies the faith of Railway Men in the character of Hale & Kilburn product



Hale & Kilburn No. 300-A
The Last Word in Reversible Seating



Hale & Kilburn No. 108-AV
The Last Word in Stationary Seating

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Hale & Kilburn

Philadelphia
Washington

New York
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European Branch: G. D. PETERS &

racter in Car Seating

Beats the World for Strength and Lightness.
be Equipped with it.

and service, and shows that when they specify that seat, they expect something more than an assembly of steel, hardwood and upholstery—they expect the CHARACTER that goes into all seats of this make—the character that from the start of the industry has invariably given the utmost in Quality and Durability to seat equipment.

Largest Car Seat Works in the World

During the New Year, we expect to give the same characteristic service to everyone at home or abroad, whether you order seats for one car or one hundred cars.

Corporation

Detroit St. Louis
Louisville Dallas
COMPANY, London, Paris, Brussels

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COPYRIGHTED

COLLIER SERVICE

CAR
ADVERTISING
ALMOST
EVERYWHERE

Barron G. Collier
INCORPORATED

Candler Building
220 West 42d Street, New York City

For Distinguished Service

The emblems awarded for distinguished military service by the United States and the Allied Governments are shown on the two following pages.

The emblems are:

UNITED STATES

Congressional Medal of Honor for the Army and the Navy:—Instituted by Act of Congress, 1863 and awarded to officers and enlisted men, in the name of Congress, for particular deeds of most distinguished gallantry in action.

Distinguished Service Cross:—Instituted January 12, 1918, and awarded in the name of the President to any person distinguishing himself by extraordinary heroism against an armed enemy under circumstances which do not justify the award of the Medal of Honor.

Distinguished Service Medal:—Instituted January 12, 1918, and awarded to any person who has rendered exceptionally meritorious service in a duty of great responsibility in time of war.

ENGLAND

Victoria Cross:—Instituted in 1856. For officers and men in the army or navy who perform some signal act of valor in the presence of the enemy.

Distinguished Service Order:—Established in 1886. For officers of the army or navy who have been especially recommended in dispatches for merit or distinguished service.

Military Cross:—Instituted in 1914. For warrant and commissioned officers in the army including the rank of Captain recommended by the Secretary of State for War.

FRANCE

Legion of Honor:—Established in 1802. For distinguished military or civil service. Divided into five classes.

Military Medal:—Instituted in 1852. For enlisted men or commanders-in-chief who perform especially distinguished or meritorious service.

Croix de Guerre (War Cross):—Instituted since the beginning of the present war. For officers or men performing acts of bravery in the military or naval service.

ITALY

Medal of Military Valor:—Instituted in 1793. For officers or men in the army or navy who show especial bravery. Three grades represented by gold, silver or bronze medals.

Order of the Crown of Italy:—Instituted in 1863. Awarded for signal and meritorious service. Divided into five classes.

BELGIUM

Order of Leopold:—Established in 1838. Awarded for distinguished military or civil service. Divided into five classes.

War Cross (Croix de Guerre):—Instituted since the beginning of the present war and corresponds to the French War Cross.

CONSOLIDATED CAR HEATING CO., ALBANY

Photos courtesy of American Numismatic Society, New York.

U. S. Navy
Medal of Honor
U. S. Distinguished
Service Cross
France
Croix de Guerre
Belgium
Order of Leopold
Italy—Medal
of Military Valor
France
Military Medal
France
Legion of Honor
Car Heating Company

In the Name of Pity—Give!

Oh, America of the great heart, the cry of the stricken peoples of the Near East is heard at your door.

You have been so close to us through all the years of our struggles toward the light. Your hands outstretched to us have never been empty.

AND now we cry to you from the depths of a greater need than even our torn souls have ever known. In the name of pity—do not fail us!

There has been cruel suffering in our lands, massacre, famine, death. But the spirit of our people still lives, and calls to you across the sea to send help lest we perish.

Our God is your God, and we bare our souls for your searching eyes that you may see how we have never denied Him, nor shamed Him. When our world rocked in misery about us, in our torn and tortured bodies our hearts still cradled and sheltered the crucified Christ. We held true in our allegiance to God and humanity.

The people of the Near East are old in suffering. The way we have traveled has been Via Dolorosa, the way of tears and blood. And now—we are so low in the dust that only your young, unshattered strength can raise us.

Every dollar subscribed goes to the Relief Work

All expenses are privately met

All funds are cabled through the Department of State

All funds are distributed through U. S. Consuls or American Agencies

Our Government is prevented from giving aid

The Red Cross is not organized for Relief Work in these sections

This Space Contributed by

Electric Railway Journal

Around the world the news has gone, is ringing today clarion-clear, that America's men and America's women have never yet been called upon in vain to right a wrong, to protect the weak, to succor the defenseless. We cry to you, help us—America! We are Armenian, Syrian, Greek, Jew, and we speak strange tongues, but our need of you is so great. What is left of our children are starving. What is left of our men and women, young men and maidens, are without work, without shelter, without clothing, racked with disease. Open your great hearts and give, and our people will pay. In the years to come, how they will pay in return! You, who are so safe and strong beyond the reach of such misery as ours, open your heart to our cry.

17c a day—$5 a month—$60 a year will buy life for one of us.

In the name of pity—give!

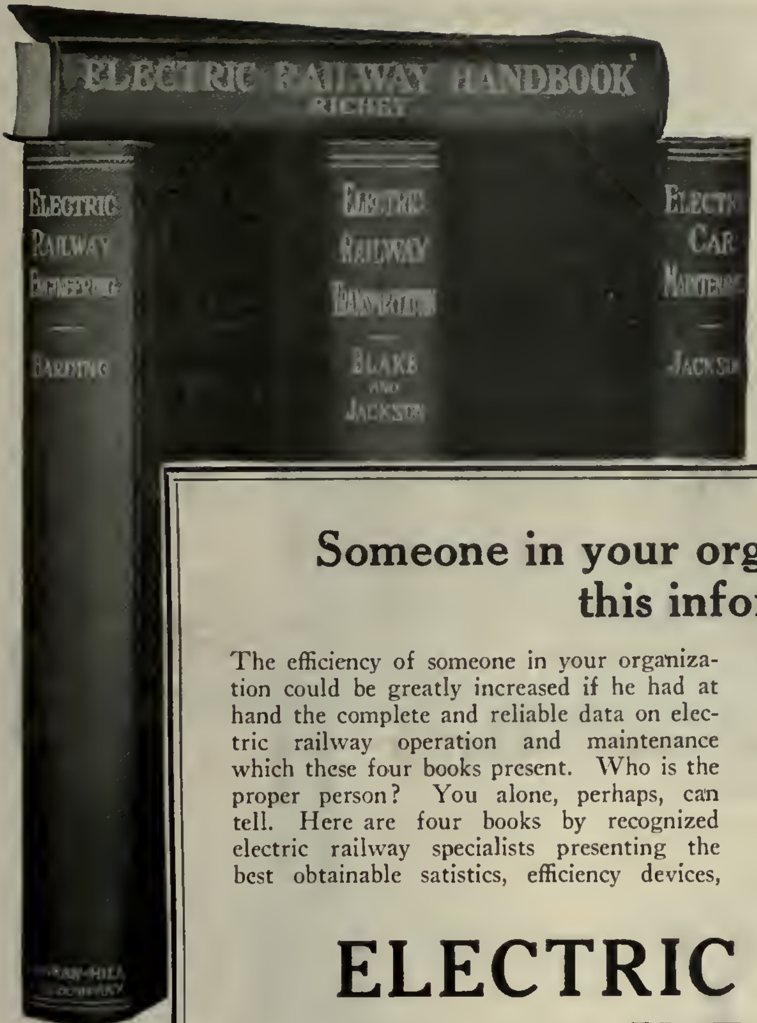
Campaign for $30,000,000

Make contributions payable to

Cleveland H. Dodge, *Treasurer*

American Committee for Relief in the Near East

(Formerly American Committee Armenian-Syrian Relief)


ELECTRIC RAILWAY HANDBOOK
RICHEY
ELECTRIC RAILWAY ENGINEERING
HARDING
ELECTRIC RAILWAY TRANSPORTATION
BLAKE AND JACKSON
ELECTRIC CAR MAINTENANCE
JACKSON
McGRAW-HILL COMPANY

Give us his name—

Someone in your organization could use this information

The efficiency of someone in your organization could be greatly increased if he had at hand the complete and reliable data on electric railway operation and maintenance which these four books present. Who is the proper person? You alone, perhaps, can tell. Here are four books by recognized electric railway specialists presenting the best obtainable satistics, efficiency devices, and engineering methods, with reports and comparisons of different systems. They are valuable. They are helping hundreds of electric railway executives in meeting the perplexing new demands of the day. Why not look the books over and see for yourself what they are and decide who in your organization should use them?

ELECTRIC RAILWAY LIBRARY

The one book—Richey's HANDBOOK—is a pocket encyclopedia of electric railway construction, operation and maintenance. It is the Webster of the industry. ELECTRIC RAILWAY ENGINEERING is a thorough and practical manual of the broader engineering problems. ELECTRIC RAILWAY TRANSPORTATION covers the business side of the subject—the relation of traffic to profits. It is packed full of priceless information on traffic conditions, their causes and their relation to electric railway efficiency. ELECTRIC CAR MAINTENANCE has saved money for hundreds of lines. It is a complete treatment of this special subject.

We are so convinced of the value of this library that we invite you to use the books for ten days without charge. You simply agree to return the books, postpaid, within 10 days of their receipt or to remit $3.00 and $3.00 each month thereafter for 4 months until the total price of $15.00 is paid. Use the coupon.

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No money down.

Small monthly payments.

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You may send me the Electric Railway Library for my inspection. If the books prove satisfactory, I will send $3.00 in ten days and $3.00 per month for four months—until I have paid the price of the books—$15.00. If the books are not what I want, I agree to return them postpaid within 10 days of receipt.

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Signed ....

Address ....

Reference ....

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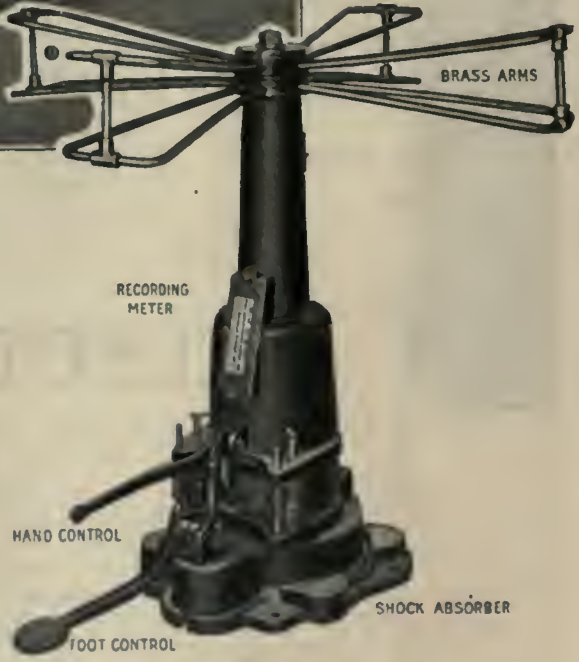
E-1-4-19

Faster than the Fastest Ticket Seller!

Portion Newark Terminal, Newark, N. J., showing Perey Turnstile Installation.



PEREY

Turnstiles

Get ALL the FARES

There is no guesswork about the operation of the Perey Turnstile. Its work is absolute. It registers ALL the fares. When you have it installed, at terminals, in prepayment areas, ferries, subway and elevated stations, the operator settles with the company according to the register in the turnstile. There is no ground for anxiety, suspicion or mistakes on either side. All the passengers that ride have paid.

You can handle terminal crowds more easily, and three times faster with the Perey Turnstile than by any other method or device. "The machine is faster than the cashier."

It saves money by eliminating breakage and rough handling of equipment. It saves labor. Women operators can be employed.

We are prepared to make a study of your operating conditions, and fare collection problems—let us hear from you.

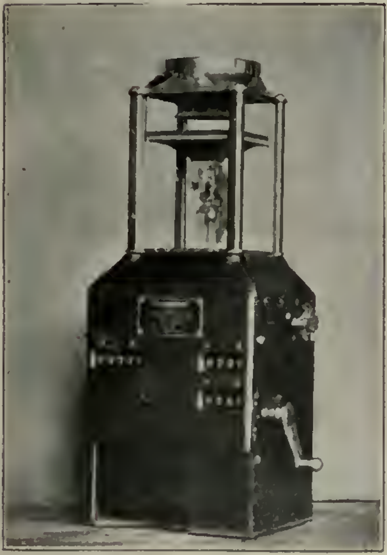
PEREY MANUFACTURING CO., Inc.
30 Church St., New York City

Johnsons insure 100% Fare Collection

-thereby meeting the big demand of todays conditions

Johnson Metal Tickets

are being generally adopted to relieve fare collection problems, take care of fare increases, etc. 3½ million of these metal tickets were furnished to electric railways in 1918.



With Electric Railway Lines all over the country fighting for fare-revenue commensurate with operating expenses, it is a matter of vital importance to install a farebox that insures the turn-in of *every penny of available revenue.*

Johnson Fareboxes provide such a system of fare collection—flexible enough to handle cash, cash tickets, commutation or passes, recording each with *absolute* correctness.

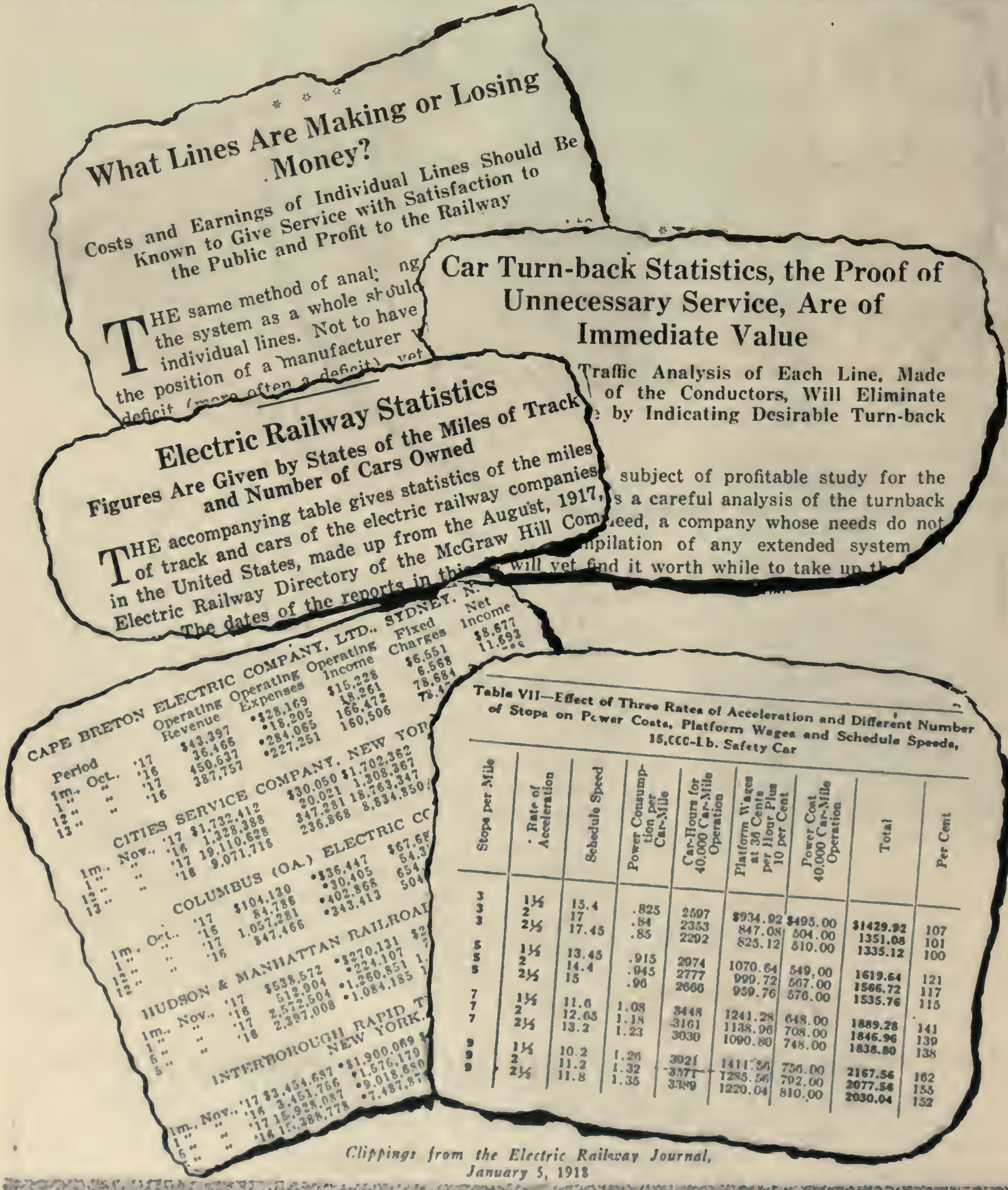
The passenger *deposits his own fare.* The conductor is a change maker. He is not tempted to become a change taker. Johnson Fareboxes save time for both passengers and conductor. They speed up loading and unloading and get cars away quickly.

More than 15,000 in use on prominent railways. Let us send full information.

JOHNSON FARE BOX COMPANY

Jackson Boulevard and Robey St., Chicago
50 East 42nd Street, New York

You Run Your Rai



* * *

What Lines Are Making or Losing Money?

Costs and Earnings of Individual Lines Should Be Known to Give Service with Satisfaction to the Public and Profit to the Railway

THE same method of anal ng the system as a whole should individual lines. Not to have the position of a manufacturer w deficit (more often a deficit) yet

Car Turn-back Statistics, the Proof of Unnecessary Service, Are of Immediate Value

Traffic Analysis of Each Line, Made of the Conductors, Will Eliminate e by Indicating Desirable Turn-back

subject of profitable study for the s a careful analysis of the turnback eed, a company whose needs do not mpilation of any extended system will yet find it worth while to take up th

Electric Railway Statistics

Figures Are Given by States of the Miles of Track and Number of Cars Owned

THE accompanying table gives statistics of the miles of track and cars of the electric railway companies in the United States, made up from the August, 1917, Electric Railway Directory of the McGraw Hill Com The dates of the reports in thi

CAPE BRETON ELECTRIC COMPANY, LTD., SYDNEY, N.

Period		Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Oct.	'17	$43,397	*$28,169	$15,228	$6,551	$8,677
1 " "	'16	36,466	*18,205	18,261	6,568	11,693
12 " "	'17	450,637	*284,065	166,472	78,684	
13 " "	'16	387,757	*227,251	160,506	78,4	
CITIES SERVICE COMPANY, NEW YOR						
1m., Nov.,	'17	$1,732,412	$30,050	$1,702,362		
1 " "	'16	1,328,388	20,021	1,308,367		
12 " "	'17	19,110,628	347,281	18,763,347		
13 " "	'18	9,071,718	236,868	8,834,850		
COLUMBUS (GA.) ELECTRIC CO						
1m., Oct.,	'17	$104,130	*$36,447	$67,68		
1 " "	'16	84,786	*30,405	54,3		
12 " "	'17	1,057,281	*402,868	654,		
12 " "	'16	847,466	*343,413	504		
HUDSON & MANHATTAN RAILROAD						
1m., Nov.,	'17	$538,572	*$270,131	$2		
1 " "	'16	512,904	*224,107			
5 " "	'17	2,572,504	*1,260,851	1.		
5 " "	'16	2,397,008	*1,084,185	1		
INTERBOROUGH RAPID T NEW YORK						
1m., Nov.,	'17	$3,454,687	*$1,900,069			
1 " "	'16	3,451,766	*1,576,170			
5 " "	'17	15,928,087	*9,018,880			
5 " "	'16	15,288,778	*7,487,87			

Table VII—Effect of Three Rates of Acceleration and Different Number of Stops on Power Costs, Platform Wages and Schedule Speeds, 15,000-Lb. Safety Car

Stops per Mile	Rate of Acceleration	Schedule Speed	Power Consumption per Car-Mile	Car-Hours for 40,000 Car-Mile Operation	Platform Wages at 36 Cents per Hour Plus 10 per Cent	Power Cost 40,000 Car-Mile Operation	Total	Per Cent
3	1½	15.4	.825	2597	$934.92	$495.00	$1429.92	107
3	2	17	.84	2353	847.08	504.00	1351.08	101
3	2½	17.45	.85	2292	825.12	510.00	1335.12	100
5	1½	13.45	.915	2074	1070.64	549.00	1619.64	121
5	2	14.4	.945	2777	990.72	567.00	1566.72	117
5	2½	15	.96	2666	959.76	576.00	1535.76	115
7	1½	11.6	1.08	3448	1241.28	648.00	1889.28	141
7	2	12.65	1.18	3161	1138.96	708.00	1846.96	139
7	2½	13.2	1.23	3030	1090.80	748.00	1838.80	138
9	1½	10.2	1.26	3921	1411.56	756.00	2167.56	162
9	2	11.2	1.32	3571	1285.56	792.00	2077.56	155
9	2½	11.8	1.35	3389	1220.04	810.00	2030.04	152

Clippings from the Electric Railway Journal, January 5, 1918

vay On Statistics-

Run Your
Statistics
On the
MONROE
Calculating Machine

Not only Adds but Subtracts, Divides and Multiplies as easily as other machines add.

Portable occupies less than a square foot of space

THE importance of statistics in railway operation can hardly be overestimated. In order to determine policies and maintain efficient operation, a vast amount of data must be classified and tabulated so as to reveal at a glance the desired information.

The MONROE Calculating Machine is perfectly adapted to important work. MONROE speed and direct, simple action enable an inexperienced operator to make intricate calculations in minimum time.

The MONROE Visible Check is a positive *guarantee of accuracy,* an essential requirement on this kind of work. The operator checks *automatically* each operation as he proceeds. Consequently no time is wasted in going over the figures several times in order to verify results.

Let the MONROE show you how it will speed up your Designs, Estimates, Payrolls, Costs—anything you may have in figures—and you can feel safe as to Results the first time without rechecking.

Simply send along the coupon today, which is simply a convenient way for you to put Monroe claims to a test, without obligating you.

MONROE
Calculating Machine Company
Woolworth Bldg., New York City
Offices in Principal Cities

Monroe
Calculating
Machine Co.,
Woolworth Bldg.,
New York City.

Without obligating us:
☐ Send a copy of your book, "Engineering Formulae."

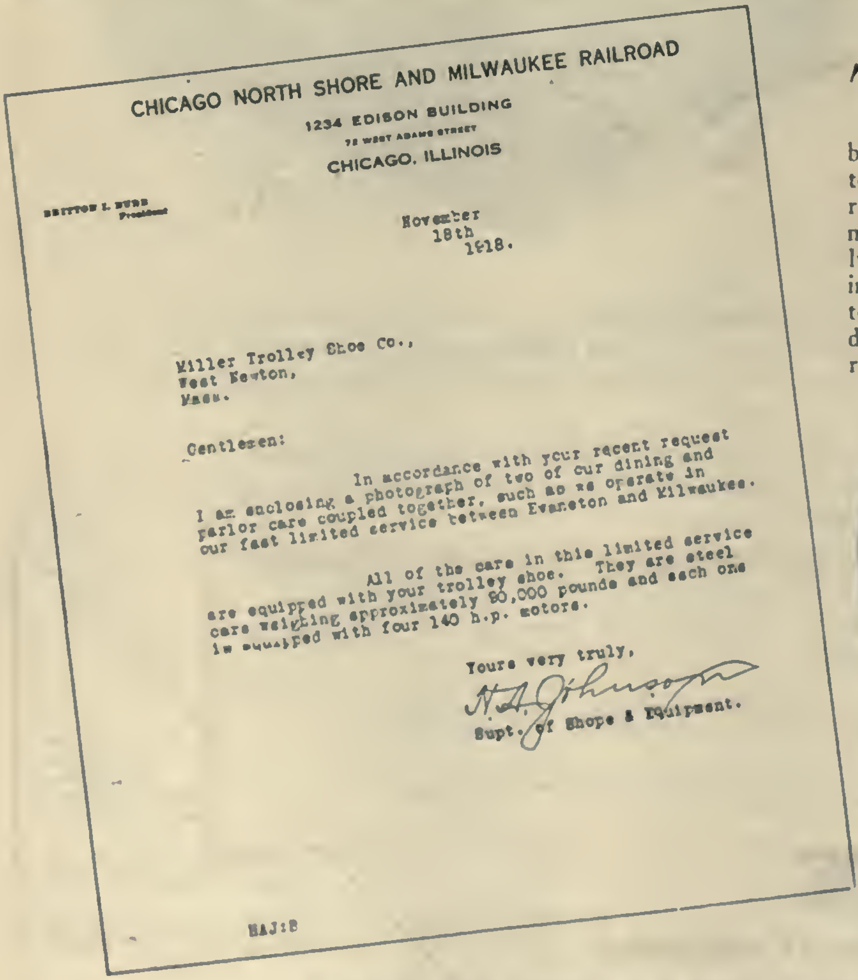
☐ Have the Monroe man call when in this vicinity and arrange for demonstration.

Name ....

Address ....

E. R. J.-1-4-19

Equipped with
Miller Trolley Shoes



CHICAGO NORTH SHORE AND MILWAUKEE RAILROAD
1234 EDISON BUILDING
72 WEST ADAMS STREET
CHICAGO, ILLINOIS

BRITTON I. BUDD
President

November
18th
1918.

Miller Trolley Shoe Co.,
West Newton,
Mass.

Gentlemen:

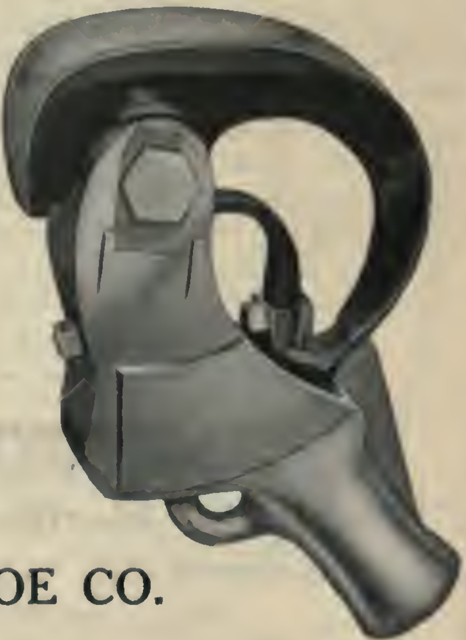
In accordance with your recent request I am enclosing a photograph of two of our dining and parlor cars coupled together, such as we operate in our fast limited service between Evanston and Milwaukee.

All of the cars in this limited service are equipped with your trolley shoe. They are steel cars weighing approximately 80,000 pounds and each one is equipped with four 140 h.p. motors.

Yours very truly,
H. A. Johnson
Supt. of Shops & Equipment.

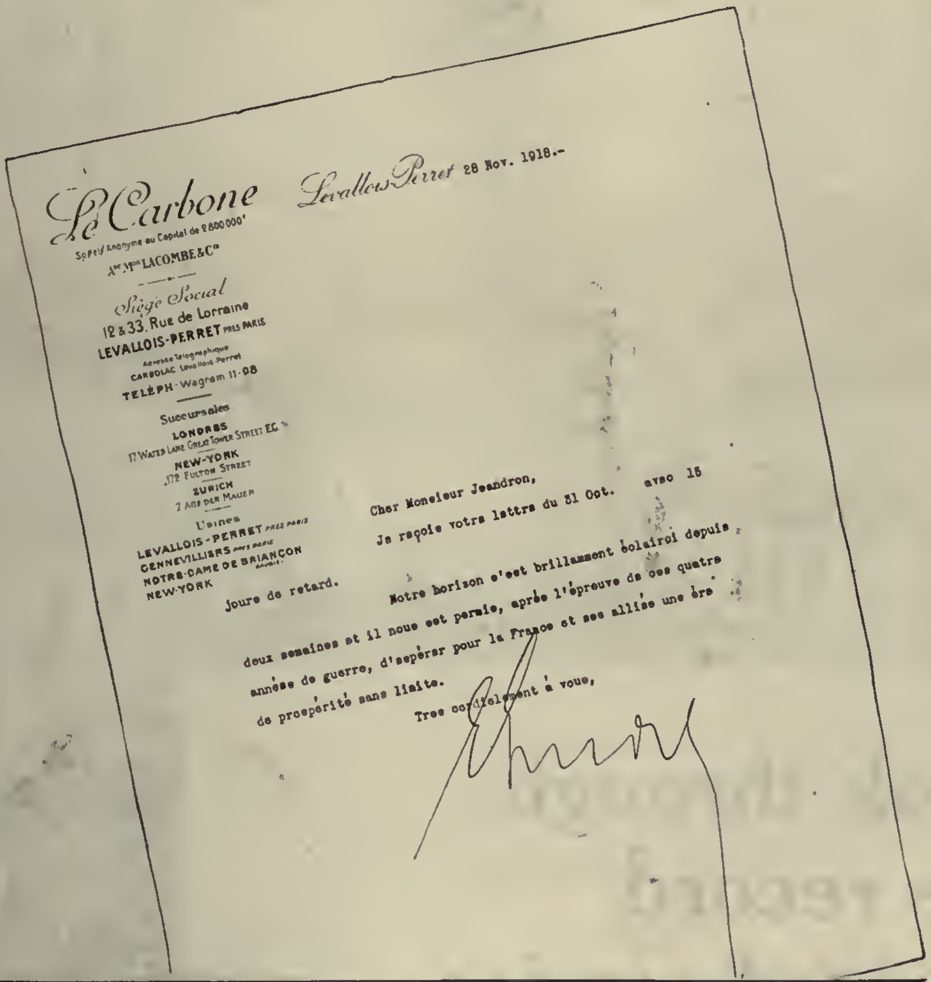
HAJ:B

THE Chicago, North Shore and Milwaukee Railroad uses Miller Trolley Shoes for their fast limited service because they are the ideal current collectors. They eliminate arcing and noise—reduce dewirement to minimum—which means *reducing transportation delays.* No lubricants—save *oil* and *labor* for more important purposes. Delivers more power to the motors. Gives greater mileage. Reduces maintenance cost. Standard on many roads. Have you tried them on *yours?*



MILLER TROLLEY SHOE CO.
West Newton, Mass.

From FRANCE *To* AMERICA



Le Carbone
Sté Anonyme au Capital de 2800 000f
Ane Mon LACOMBE & Cie

Siège Social
12 & 33, Rue de Lorraine
LEVALLOIS-PERRET PRES PARIS
Adresse Télégraphique
CARBOLAC Levallois-Perret
TÉLÉPH. Wagram 11-08

Succursales
LONDRES
17 Water Lane Great Tower Street E.C.
NEW-YORK
172 Fulton Street
ZURICH
2 Am der Mauer

Usines
LEVALLOIS-PERRET PRES PARIS
GENNEVILLIERS PRES PARIS
NOTRE-DAME DE BRIANÇON SAVOIE
NEW-YORK

Levallois-Perret 28 Nov. 1918.-

Cher Monsieur Jeandron,

Je reçois votre lettre du 31 Oct. avec 15 jours de retard.

Notre horizon s'est brillamment éclairci depuis deux semaines et il nous est permis, après l'épreuve de ces quatre années de guerre, d'espérer pour la France et ses alliés une ère de prospérité sans limite.

Très cordialement à vous,

Levallois-Perret, Nov. 28, 1918.

Dear Mr. Jeandron:

I have received your letter of Oct. 21st after 15 days delay.

Our horizon has been brilliantly lighted for two weeks and we are now permitted after the ordeal of four years of war, to hope, for France and her Allies, an era of unlimited prosperity.

Very cordially yours,

E. GINDRE.

W. J. JEANDRON

173 Fulton Street, New York City
Pittsburgh Office: 634 Wabash Bldg.
Canadian Distributors:
Lyman Tube & Supply Co., Ltd., Montreal and Toronto

Look through the record of good service in car materials

The record made by the *actual service* of the materials at work—and you will find ample evidence that **PANTASOTE** Curtains and **AGASOTE** Roofing—Headlining—Wainscoting have proven to be big factors in developing "better service at lower cost."

THE PANTASOTE COMPANY

11 Broadway, New York People's Gas Bldg., Chicago, Ill. 751 Monadnock Bldg., San Francisco, Cal.

STANDS THE WEAR

Being made of extra quality stock, smoothly braided

SAMSON SPOT TROLLEY CORD

gives long service. Being thoroughly water-proofed it resists the action of the weather. Know it by the Colored Spots, and don't overlook the fact that

SAMSON BELL AND REGISTER CORD

represents the same durability and economy.

All sizes, all colors
Samples and prices gladly sent

SAMSON CORDAGE WORKS, BOSTON, MASS.

These Columbia Tools

can turn out Bearings for you at once

YOU will understand the perfection of Columbia-made products when we tell you that we have several hundred machine tools alone.

Practically each tool, be it drill, shaper, borer, grinder, planer or lathe, is handled by the same man day in, day out.

Such specification inevitably results in turning out the best possible work.

That's only one of the many reasons for using Columbia-made products.

Columbia Machine Works & Malleable Iron Co.

Atlantic Ave. and Chestnut St.
Brooklyn, N. Y.

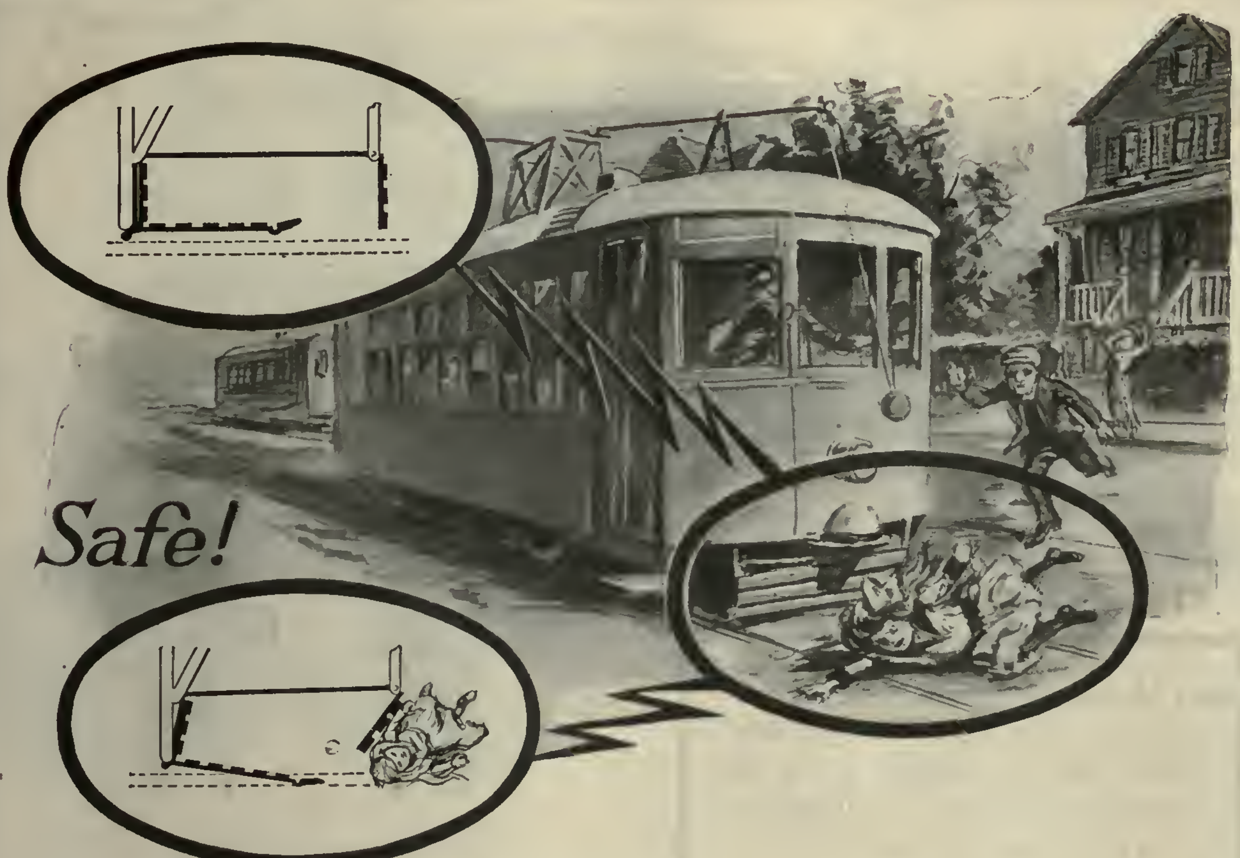
W. R. Kerschner Co., Inc., N. Y.
Holden & White, Inc., Chicago
F. F. Bodler, San Francisco
Railway & Power Eng. Co., Ltd., Toronto, Ont.

TOOLS

- Armature and Axle Straighteners
- Armature shaft straighteners
- Armature buggies and stands
- Babbitting molds
- Banding and heading machines
- Car-hoists
- Car replacers
- Coil Taping machines for armature leads
- Coil winding machines
- Pinion pullers
- Pit jacks
- Signal or target switches
- Tension stands

CAR EQUIPMENT

- Armature and axle bearings
- Armature and field coils
- Bearings (axle and armature)
- Brush-holders and brush-holder springs
- Brake, door and other handles
- Brake forgings, riggings, etc.
- Car trimmings
- Commutators
- Controller handles
- Forgings of all kinds
- Gear cases (steel or malleable iron)
- Grid resistors
- Third-rail shoe beams and accessories
- Trolley poles (steel) and wheels



H-B Life Guards
Front End Safety Insurance

Act Like Lightning!

A speeding car—a running child—a stumble—and the lightning-like action of the H-B has saved your road a damage claim and a stain on your reputation.

For the H-B is RELIABLE. It works right EVERY time. And it works like lightning.

In Washington—in Roanoke—in San Antonio—in Tacoma—in Austin—in numberless other cities under the most varying conditions H-B Life Guards have proved their reliability.

H-BLifé Guards are one of the greatest single elements in making the safety car SAFE. That's why they are the standard life-fending device of America.

The Consolidated Car Fender Co.
Providence, R. I.
General Sales Agent
Wendell & MacDuffie Co.
61 Broadway, N. Y.

Here's the Hensley Story

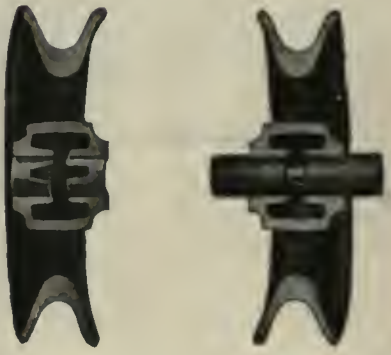
Better Melting of metal—an up-to-the-minute oil burning furnace with great capacity enables us to get absolute uniformity in all heats—a better wheel is the result.

Faster Moulding—a new automatic moulding equipment—which gives accurate, uniform castings, eliminates delays and inaccuracies incident in the human element in moulding.

More Accurate Machinery—an up-to-date machine process has been installed, which enables us to finish trolley wheels quickly, cheaply and accurately.

All Wheels Carefully Tested—All wheels are carefully tested for defects before being packed.

Delivery and Shipping Facilities are equally as "speedy" as our other advanced facilities. All of which is backed up by our 15 years' experience in Brass and Bronze foundry work and trolley wheel manufacture.



60 Miles an Hour! —but perfectly lubricated—it's a

HENSLEY

It has a positive *force-feed*—the ONLY trolley wheel so made. Oil it twice a week (takes 3 seconds) and *forget it.* Forget friction, wear and maintenance. Centrifugal force works to deliver the grease—so *the swifter the pace the better the lubrication.* Ask us about our trial offer.

Hensley Trolley & Mfg. Co., Detroit, Mich.

You will find them nice people to do business with.

Eureka

NOW—for Rejuvenation!

Steel and Trolley Wheels

are made from tough, durable bronze—no scrap used. Machined on specially-designed machinery that makes possible a "just right" job. The accurate balance of Eureka wheels insures true running wheel and gives greater mileage with a minimum amount of wear on wire.

Line Material

is made from uniformly tough and durable metal mixed in our own plant. In order to obtain a tight and smooth clinch, Eureka ears for round wire are cast solid. The grooves are milled centrally with practically no variation in thickness of clinching walls. This makes soldering unnecessary when Eureka ears are used. If so ordered, Eureka ears are furnished tinned. All Eureka standard ears for round and figure 8 wire carried in stock for immediate delivery.

Commutators and Controller Parts

are guaranteed interchangeable with standard design. Commutator segments and controller fingers are made of hard-drawn or drop forged copper. Best grade of Canadian amber mica is used for all commutator insulation. Finger springs are made from our special alloy phosphor bronze. Special parts made to order. All standard parts shipped from stock.

THE EUREKA COMPANY

NORTH EAST, PENNSYLVANIA

—whose products make every maintenance dollar give one hundred cents worth of SERVICE

COLUMBIA MACHINE WORKS
AND MALLEABLE IRON CO.
Atlantic Ave. and Chestnut St.
Brooklyn, N. Y.

CINCINNATI CAR CO.
Cincinnati, Ohio

W. R. KERSCHNER CO., Inc.

KEYES PRODUCTS CO.
120 Broadway, New York

C. I. EARLL
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ALBANY CAR WHEEL CO.
Albany, N. Y.

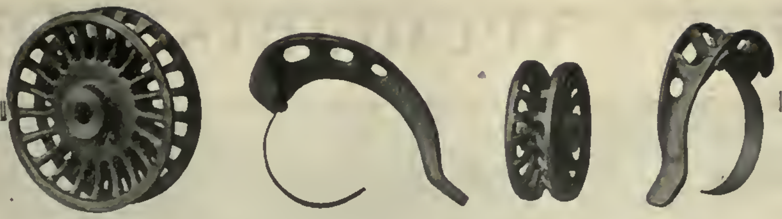
Centralize Your Buying

We represent the above companies as eastern sales agents.
We sell the following equipment for electric railways:—

- Axles
- Cars, Passenger, Freight and Express
- Cleaners and Scrapers, Track
- Couplers, Car
- Fenders and Wheel Guards
- Gates, Car
- Registers and Fittings
- Trucks
- Ventilators, Car
- Ceiling, Car
- Headlining
- Roofing, Car
- Catchers and Retrievers, Trolley
- Wheels, Car
- Armature Shaft and Axle Straighteners
- Armature Buggies and Stands
- Babbitting Molds
- Banding and Heading Machines
- Car Hoists
- Car Replacers
- Coil Taping Machines
- Coil Winding Machines
- Pinion Pullers
- Pit Jacks
- Signal or Target Switches
- Tension Stands
- Armature and Axle Bearings
- Armature and Field Coils
- Bearings (Axle and Armature)
- Brush-holders and Brush-holder Springs
- Brake, Door and other Handles
- Brake Forgings, Riggings, etc.
- Car Trimmings
- Commutators
- Controller Handles
- Forgings of all kinds
- Gear Cases (Steel and Malleable Iron)
- Grid Resistors
- Third-rail Shoe Beams and Accessories
- Trolley Poles (steel) and wheels

When you are in the market for any of the above equipment or material send us your inquiries. We will personally attend to your requirements, in other words, besides the goods we give you service worth buying. Centralize your buying.

W. R. Kerschner Co., Inc.
50 Church Street, New York



Hundreds in Stock

Make Your Winter Service Dependable

Use Nuttall Sleet Wheels and Scrapers

4 1/4 to 6-In. Dia. 1/2 to 5/8 In. Wheel Axle

When Old King Winter covers your wires with a coating of ice, what will the result be? Will your cars run on the usual schedule or will there be a tie-up over your entire system? Proper equipment will determine the result.

The proper equipment is Nuttall Union Standard Sleet Wheels and Scrapers. They keep your wires free from ice and are made in two sizes, 4¼-in. and 6-in.

ORDER NOW

R. D. Nuttall Company
Pittsburgh, Pa.

Nuttall Gears

EVERY GEAR REGISTERED

Hot Box Accidents Must Go

COSMIC
METAL BEARINGS

Prevent Hot Boxes—Eliminate Babbitting

If we fail to eliminate your Bearing Troubles, no matter how chronic, we make no charge.

Cosmic Metal bearings for armature, axle or motor are made exceptionally strong and tough, to give long life and a slow, even rate of wear. Under actual working conditions and tests they have proved far more dependable than bearings made of other metals.

They have sufficient strength to carry any load and are easily lubricated. If, through accident or other cause, they should not be properly lubricated, they will continue to run *without injuring the machinery* until attended to.

This is a very important point, because ordinary bearings which are improperly lubricated, or hard to lubricate, will generate intense heat. This rapidly causes the bearing to melt, or to fuse and stick, causing serious and costly damage to machinery.

Bearings made of Cosmic Metal will not stick or grab the shaft or axle, even though lubrication does not reach them. They prevent hot boxes with their resultant accidents, and in the end are a much safer and more economical equipment than any other bearing. Let us send further information.

COSMIC METAL COMPANY

420 Walnut Street, Philadelphia

Jacksonville Is Boyerized

It began to use Boyerized Bushings and Pins three years ago—

And it has been using these economical, long-life, greater-safety parts of brake-rigging ever since.

Railways that once try Boyerized Pins and Bushings stick to them.

If you are not using Boyerized Pins and Bushings, you had better write us about our prices, shipping facilities and quality. The scarcer labor is today and the higher the cost of shopping cars, the more you need these products.

Bemis Products

Bemis Trucks, Case Hardened Brake Pins, Case Hardened Bushings, Case Hardened Nuts and Bolts, Manganese Brake Heads, Manganese Transom Plates, Manganese Body Bushings, Bronze Axle Bearings.

ELECTRIC RAILWAY SUPPLIES
Bemis Car Truck Company
SPRINGFIELD MASS

Leave Nothing to Chance

—or chance may leave you—in a hole.

It pays to give careful study to the question of bearings — to eliminate hit-or-miss practices and specify only according to known and established merit.

Your choice will settle on

MORE-JONES
"TIGER" BRONZE
AXLE AND ARMATURE
BEARINGS

In "Tiger" Bronze Bearings you get the benefit of all we have learned about bearing metal in over forty years of foundry experience; plus the best and purest material; plus a special method of casting.

The proof of their superiority is found in the records they have made for consistently reliable, long-wearing, anti-frictional service.

Further information and prices on application.

More-Jones Brass and Metal Co.

St. Louis, U. S. A.

Manufacturers of

Trolley Wheels and Harps, Contact Springs, Motor Axle Bearings, Armature Bearings, Truck Journal Bearings, Air Compressor Bearings, Armature Babbitt Metal and similar products

Steel for Service

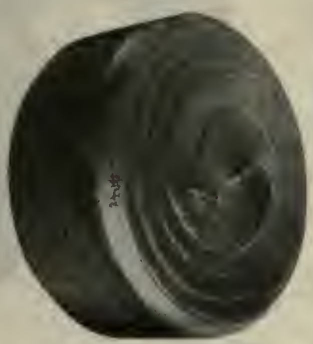


Fig. 1
Solid disc from which blanks are rolled

In various lines of industry the question of gears has been a constant problem.

This problem is similar to that common among railway officials some fifteen years ago when the increased sizes and overloading of cars created a demand for better wheels.

To meet that demand Charles T. Schoen, after careful work and experimentation, invented a process by which wheels could be rolled and on October 5, 1903, were produced the first solid rolled steel wheels made in the United States.

These first wheels were rolled from cast steel slabs and, despite defects due to imperfections in equipment and method of manufacture, gave most excellent service and some of them attained phenomenal runs. This demonstrated the merits of the solid rolled steel wheel.

July 1, 1908, Carnegie Steel Company purchased the Schoen Wheel Works and since that date has constantly improved its products, so that the solid rolled steel wheel is now well known to railway officials as the most reliable wheel for heavy and continuous service. The chief improvements made over the original Schoen method are—

1—A rolled steel slab was substituted for the original cast blank. By reason of the additional amount of work which had been performed upon the steel before the blank entered the wheel press and rolls this produced a wheel with a closer grained structure.

2—The rolled steel slab was replaced by a rolled steel disk. By this substitution the additional work due to rolling is supplemented by a blank which is forged cross-grained to the axis of the wheel and then the tread and flange is further rolled, with the result that in the finished article the finest texture is invariably found on the surfaces liable to wear.

It has been well demonstrated that by this method of manufacture it is possible to produce the very highest quality of wheels for electric and steam railway service—wheels in which there is the proper distribution of metal as between hubs, webs and rims.

Due to that success Carnegie Steel Company has offered to the trade rolled steel gear blanks made in the same way from selected rolled steel disks. These are furnished to gear cutters for further treatment and use in high duty machinery. Service use has established the superiority of gears cut from rolled steel blanks just as thoroughly as service has demonstrated the superiority of the solid rolled steel wheel.

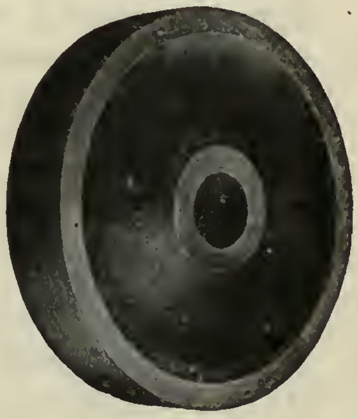


Fig. 2
Rolled Steel Gear Blank

Fig. 1 shows the disk rolled from a cylindrical bloom and cut to length by a rotary shear specially designed for that purpose. The longitudinal axis of this disk is the center of the gear. It is then placed in a rolling mill from which it receives simultaneously forging and rolling by which is produced a close grained structure which, when properly heat treated, although it will of course wear out in time, will never break. The blank as it appears ready to have the teeth cut is shown in Fig. 2.

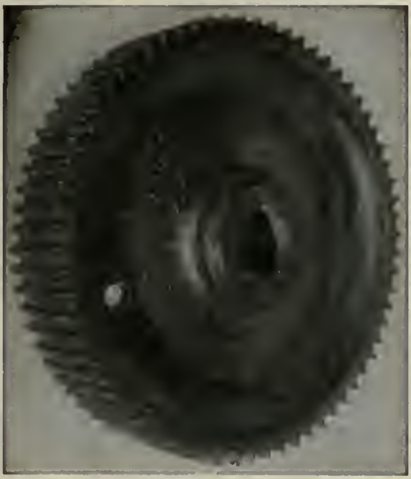


Fig. 3
Worn out but not broken

A gear worn out but not broken is shown in Fig. 3. It has been in continuous service on the bridge drive of a 50-ton hot metal crane for more than a year. The crane loaded weighed about 100 tons and served at a hot metal mixer where, due to the unavoidable presence of dirt, carbon in a graphitic form, etc., the service was unusually severe, and where the use of cast gears had been most inadequate and unsatisfactory. The teeth of this gear are worn to a thickness of $\frac{1}{8}$ in. at the pitch line without signs of fracture or breakage.

Carnegie Steel Company makes a complete range of carbon steel blanks for spur gears 12 to 36 inches in diameter. Its engineers will be glad to confer with users requiring the very best service and heavy duty work.

Carnegie Steel Company

General Offices, Pittsburgh, Pa.

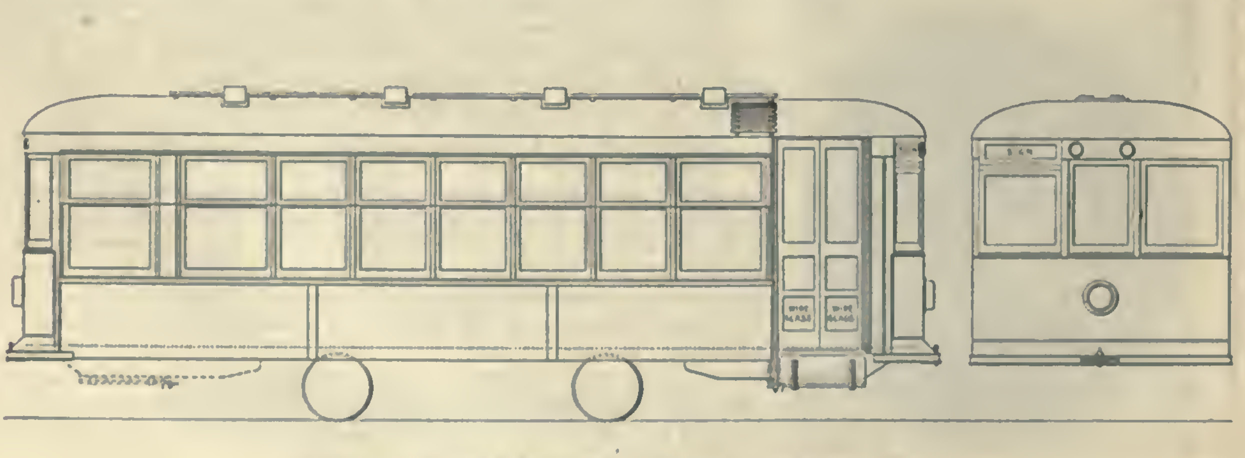
GUR

Universal Ball Bearings

Electric railways in these days of rapid change in methods of fare collection need a universal design of car flexible enough to meet all but the most congested traffic conditions in cities of any size.

This was the thought of the U. S. Bureau of Industrial Housing and Transportation when it asked the War Board of the American Electric Railway Association to present designs and specifications for a car that would be efficient practically anywhere, any time in any climate. Much of this work for a universal *large* car fell appropriately to C. O. Birney whose famous Safety Car had already proved its fitness as a universal *small* car through successful operation in scores of cities from Florida to Washington with populations up to 400,000.

And it is a significant fact that nearly every one of the hundreds of Birney Cars ordered for these installations were equipped with Gurney Ball Bearings.



Birney One-Man Universal Safety Car

NEY

for Universal Cars

Experience with these Gurney Journal and Armature Bearings on hundreds of Birney Cars justly entitles them to the adjective of *universal* for they have made good:

In cold, hot, dry and wet climates;

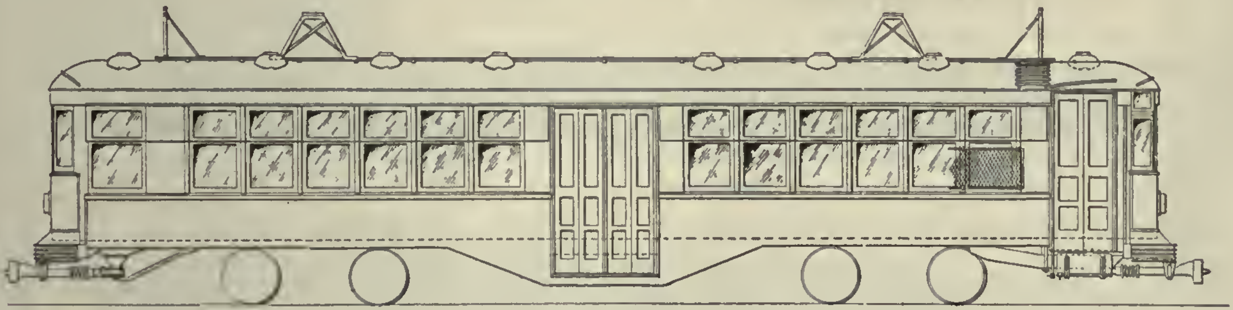
In small cities and large regardless of maintenance facilities;

In atmospheres laden with alkali or fine sand;

On heavy grades and sharp curves;

And for passenger loadings so excessive that even the truck frames—but *not* the Gurney Bearings—gave way!

Exactly the same Gurney Journal and Motor Bearings that have proved so satisfactory on the small Birney Universal Car are available for your use on the larger, double-deck Universal Car designed for the Bureau of Industrial Housing and Transportation.



Birney One-Person, Two-Person Universal Safety Car

Gurney Ball Bearing Co.

Conrad Patent Licensee
Jamestown, N. Y.

Storage Batteries
in
Electric Railway Service

LOAD REGULATION

For carrying peaks and fluctuations of load, especially in connection with water-power developments or where power is purchased on the basis of maximum demand, the "Chloride Accumulator" is adapted.

LINE REGULATION

Due to the present high price of copper there are cases where the use of a battery for maintaining voltage is more economical than the purchase of copper for feeders. The "Chloride Accumulator" has been largely used in this service by many railways.

STANBY SERVICE FOR EXCITER BUS

It is standard practice to install a storage battery connected to the Exciter Bus to prevent interruption in the supply of current for field excitation. The "Exide" Battery is used for this service.

OIL SWITCH SERVICE

Storage batteries are used in power houses and sub-stations for the operation of oil switches and supplying current for pilot lamps and emergency station lights in case of failure of the power supply. For this service the "Chloride Accumulator" and the "Exide" battery are used.

STORAGE BATTERY STREET CARS

For infrequent service or for conditions where trolley wires are prohibited, storage battery cars offer the most economical and profitable solution of the transportation problem. The "Hycap-Exide" Battery has been largely used in this service. In New York City alone there are in operation nearly 200 storage battery cars equipped with "Hycap-Exide" Batteries.

MULTIPLE-UNIT CONTROL

The "Exide" Battery is used by a number of railways for furnishing a supply of low voltage current to be used in connection with the operation of multiple-unit control systems.

INTERURBAN CAR LIGHTING

A number of interurban electric railway companies have installed batteries on their cars to maintain steady illumination and to overcome fluctuations caused by changes in line voltage, interruptions in third rail at crossings and switches or by temporary failure of power supply. For this service the "Exide" Battery is particularly adapted.

HEAD AND TAIL LIGHTS

The "Exide" Battery is being used in connection with head lights and tail lights for furnishing current in case of interruptions in power supply.

Detailed information on batteries for any of the above services can be secured from any sales office of the company.

THE ELECTRIC STORAGE BATTERY CO.

Manufacturer of

The "Chloride-Accumulator", The "Tudor Accumulator"
The "Exide", "Hycap-Exide", "Thin-Exide" and "Ironclad-Exide" Batteries

New York Boston Chicago Washington PHILADELPHIA, PA. Rochester Detroit Minneapolis St. Louis
Cleveland Atlanta Pittsburgh 1888-1919 San Francisco Denver Kansas City Toronto

Standard for 67 Years

The Chilled Iron Wheel has performed its every function at a minimum cost.

For Freight Cars

95% of all cars in this type of service are carried on Chilled Iron Wheels.

For Street Cars

The Chilled Iron Wheel is Standard for Street Car Service in 95 out of 100 cities in the United States and Canada, operating 100 cars or over.

The Conclusion

to be gained from these figures is that the Chilled Iron Wheel gives the Greatest Service for the Lowest Cost.

The Wonderful Single-Service Chilled-Iron Wheel

Association of Manufacturers of Chilled Car Wheels
1229 McCormick Building, Chicago, Ill.

Representing Forty-eight Wheel Foundries Throughout the United States and Canada. Capacity 20,000 Chilled Iron Wheels per Day.

OKONITE

TRADE MARK
REG. U. S. PATENT OFFICE.

The Standard for Rubber Insulation

Power Cables—Signal Wires—Car Wires
Motor Leads, etc., etc.

Steel Armored—Lead Covered—Braided

We Manufacture

Okonite (Rubber) Insulated Wires and Cables
Varnished Cambric Insulated Wires and Cables
Okonite Tape—(Rubber Insulating)
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Samples and Estimates on Application

THE OKONITE COMPANY, 501 Fifth Ave., cor. 42nd St., New York

CENTRAL ELECTRIC CO., Chicago, Ill., General Western Agents

F. D. Lawrence Electric Co., Cincinnati, O. Novelty Electric Co., Philadelphia, Pa. Pettingell-Andrews Co., Boston, Mass.

You Can Minimize Overhead Repair Work

and successfully cut maintenance costs if you turn to

The Macallen Line

of strain insulators, hangers, splicing ears, crossings, and other overhead material.

They are "specialty" products, designed and built to make "Macallen" the standard on American railways.

It will pay you to write for information and prices.

The Macallen Insulating Joint

Adopted by principal air brake manufacturers as part of their standard equipment. Also insulates steam pipes, etc. Shell is seamless drawn steel, nipples are machined from steel rod, and insulating material is Macallen Vulcanite Compound, not affected by heat or oil—practically indestructible.

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TRADE MACALLEN MARK

The Macallen Company
Macallen and Foundry Sts., Boston

TRADE MACALLEN MARK

ROEBLING

ELECTRICAL WIRES AND CABLES

TROLLEY WIRE INSULATED WIRES
TRANSMISSION WIRE

Galvanized E. B. B. and B. B. Telephone and Hard Drawn Copper, for Telephone Lines. Bronze and Galvanized Steel Contact Wire. Galvanized Strand for Guys, Span Wire and Messengers.

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TRENTON, NEW JERSEY

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Keep Up to Schedule Time *in Sleet Time*

The time to procure the necessary equipment for winter is *now*—before your schedules are set back, because of its lack.

Sleet Cutter

ANDERSON LINE EQUIPMENT

Sleet Wheel

is the recognized standard—equipment of demonstrated superiority. **Sleet Cutters** and **Sleet Wheels** will help to maintain schedules in stormy weather.

Every **Anderson** product is worthy—such as harps, bases, trolley wheels, frogs, splicers, sanding equipment, etc. Only **Aetna Insulation** used. *Catalog mailed upon request.*

Albert & J. M. Anderson Mfg. Company
289-93 A Street, Boston, Mass.
Established 1877
BRANCHES:
New York, 135 Broadway. Chicago, 105 So. Dearborn Street. Philadelphia, 429 Real Estate Trust Bldg. London, E.C., 48 Milton Street.

VICTOR Insulators

on your line are as valuable as the fire insurance policy on your home or factory.

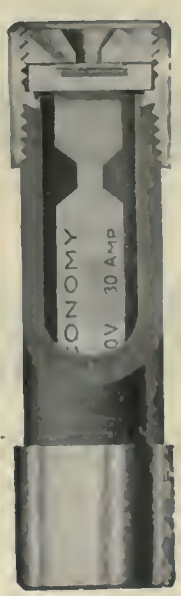
When the crisis comes you have protection. You do not have to over-insulate your lines to provide for possible defects in Victor Insulators. Load them to their capacity; they are built to stand the test.

The Locke Insulator
Manufacturing Company
Victor, N. Y.

Concluding a year of achievement

America's splendid industrial achievements in the memorable year of 1918 were made possible through the sound judgment displayed in so systematizing production as to conserve needed materials and to effect economies in operating and maintenance.

ECONOMY renewable FUSES



have played a noteworthy part by protecting vitally important electrical circuits of the U. S. Navy, the leading steel and powder mills and thousands of representative plants in all branches of industry against the fire and accident hazards of overloads and short circuits. It was due, in part, to their accurate rating and all-around efficiency that the wheels were kept turning with safety.

They have directly saved millions of dollars for their thousands of users because they cut annual fuse maintenance costs 80 per cent. as compared with the use of "One-Time" fuses.

We now face the great reconstruction period. Conservation and economy must be practiced more extensively and constructively than ever before. Economy Fuses are essentials as factors of practical economy and conservation.

Write for Catalog 17.

Economy Fuse & Mfg. Co.
Kinzie & Orleans Sts. Chicago, U. S. A.

Sole manufacturers of "ARKLESS"—the Non-Renewable Fuse with the 100% Indicator.

ECONOMY FUSES ARE ALSO MADE IN CANADA AT MONTREAL.

SAFE SIGNALS
for SAFE ROADS

No road is safe if its signal system is uncertain, unaggressive or unsubstantial.

U. S. Electric Signals are big, aggressive notices of safety or danger. A blind man could hardly disregard them. Strongly made and weather immune. Protect both front and rear of cars. Type G, illustrated here, is a simple, safe and effective signal at a low price. More than a thousand sets in daily use.

Don't wait for the accident! Write for particulars today.

United States Electric Signal Company
West Newton, Massachusetts
Representatives:
Western: Frank F. Bodler, Monadnock Bldg., San Francisco
Foreign: Forest City Electric Service Supply Company, Salford, Eng.

DU PONT AMERICAN INDUSTRIES

Set Trolley Poles In Blasted Holes

Hand digging is not an economical performance. Ground must be loosened before you can shovel it out to the desired depth. Try what others have done—

Use Red Cross Explosives
to save time, money and labor

Statistics will quickly show the superior accomplishment of this modern method. Even in cold weather, if it's not too cold for your men to work outdoors, Red Cross Low Freezing Explosives can be used without thawing—a time-consuming operation necessary with ordinary explosives.

REDUCE THE WORK —— INCREASE THE RESULT

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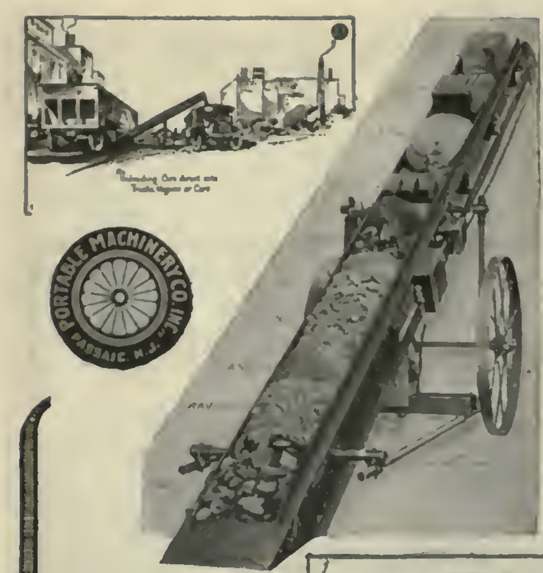

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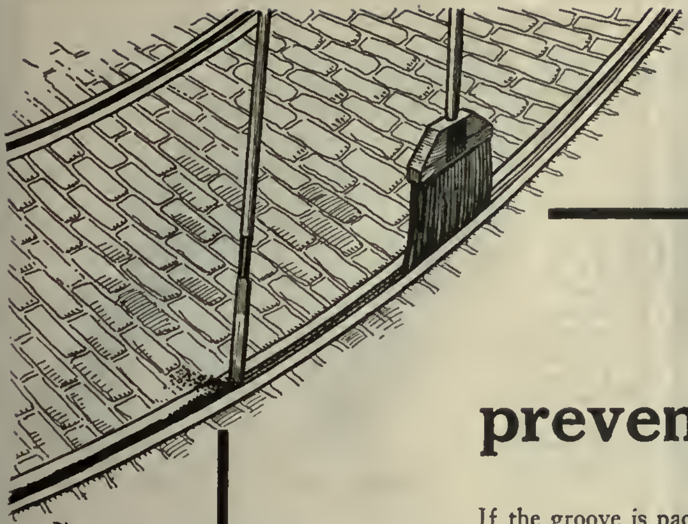

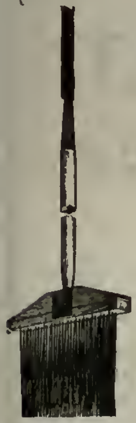

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If the groove is packed, on a curve, there's always the danger of the wheel flange riding on the obstruction, climbing the rail and derailing the car.

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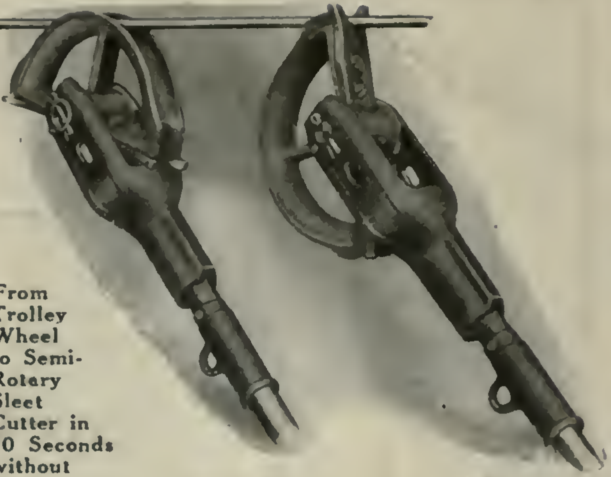

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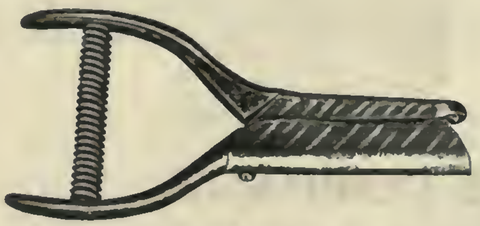

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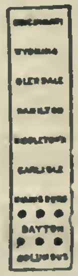

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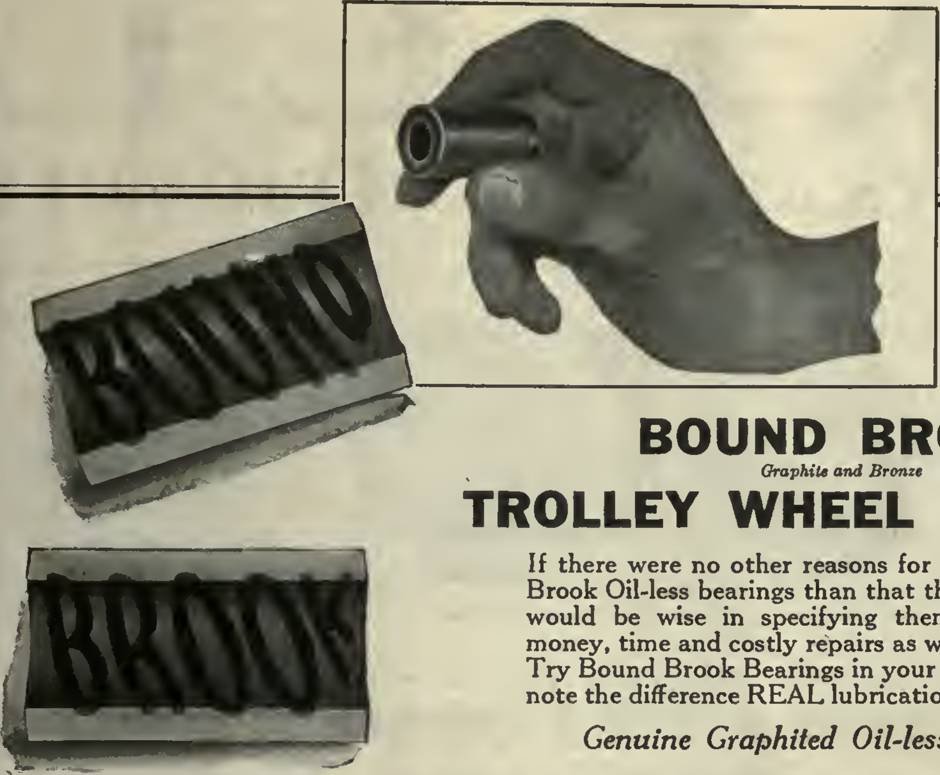

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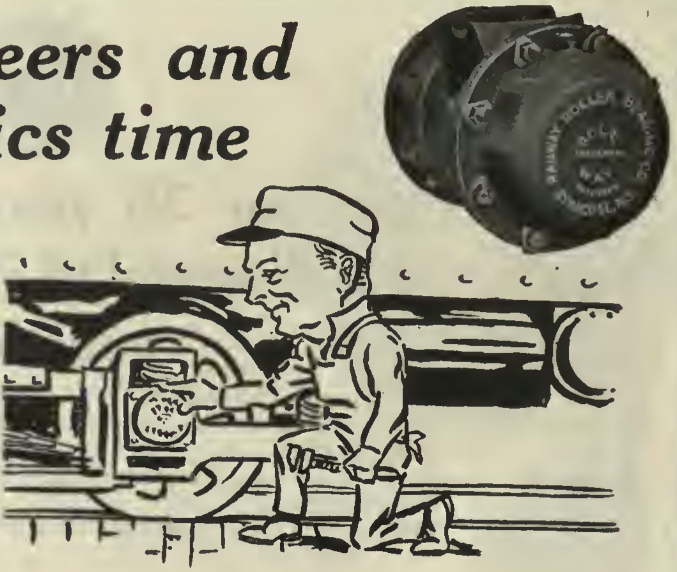

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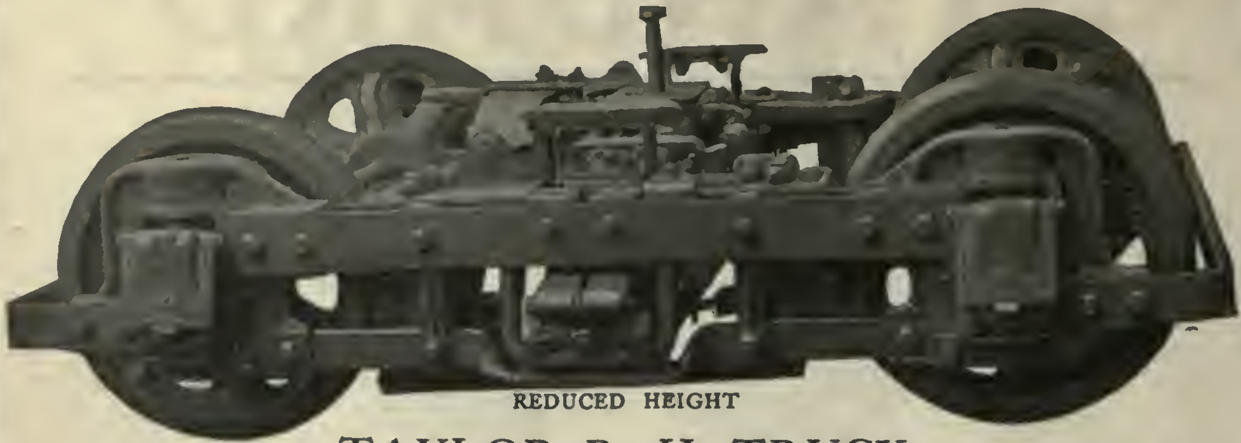

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A Word to Employers

You can secure just the man you desire to strengthen your organization by placing an advertisement in the Searchlight Section.

This paper is read by progressive men, many of whom are ambitious for better positions than they now have. They study our "Positions Vacant" columns each week for opportunities for advancement.

Hundreds of prominent employers now use this method of securing the men needed in their organizations. The cost is only 5 cents a word, minimum charge $1.50 an insertion.

May we not help YOU also?

Get Our
Price Lists on
BADGES and
PUNCHES

AMERICAN RAILWAY SUPPLY CO., 134-136 Charles St., NEW YORK

WE CAN CUT YOUR COST OF
HEATING CURRENT
Write for THERMOSTATIC CONTROL INFORMATION

GOLD

ELECTRIC HEATERS Cut Installation and Maintenance Charge.
VENTILATORS Also Ventilate in Stormy Weather.
THERMOSTATS Save Current.
ORIGINATED the use of NON-CORROSIVE Wire for Electric Car Heaters.
ORIGINATED The Ventilated Coil Support.

LET US FIGURE ON YOUR NEXT REQUIREMENTS
Gold Car Heating & Lighting Co., 17 Battery Pl., New York

You will buy
**CLEVELAND
Fare Boxes**
Eventually—
Why not now?

Cleveland Fare Box Co.
CLEVELAND, OHIO

UNIVERSAL ANTI-SLIP TREADS
cars and station steps.

Universal Safety Tread Company
Waltham, Mass.

Settle the Car Heating Problem NOW!

Peter Smith heaters combine all the good points necessary to insure perfect heating and ventilation under all conditions. They operate more economically than any other heater. Now is the time to get ready for winter. Investigate Peter Smith heaters TODAY.

THE PETER SMITH HEATER COMPANY
1725 Mt. Elliott Ave., Detroit, Mich.

Heating and Ventilating

Let us demonstrate to you how we can heat and ventilate your cars at the lowest possible cost.

The Cooper Heater Company
Carlisle, Pa.

**Direct
Automatic
Registration**
By the
Passenger

Rooke Automatic
Register Co.
Providence, R. I.

The Most Successful Men in the Electric Railway Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

MASON SAFETY TREAD—lead or carborundum filled; non-slippery; prevents accidents; cuts out damage suits.

KARBOLITH CAR FLOORING—for steel cars; is sanitary, light weight, fire proof, non-slippery.

STANWOOD STEPS—Self-cleaning, non-slippery, light.

Our products used on all leading railroads, on cars and stations. For details address:

AMERICAN MASON SAFETY TREAD CO., Lowell, Mass.
Branch Offices: Boston, New York City, Philadelphia.
Agencies in all principal cities.

M-R INSULATION MFG CO

"Everything in Insulation"

Mica	Waxes
Vulcanized Fibre	Asphalts
Varnished Cloth	Compounds
Insulating Tapes	Insulating Varnish

The above are only a few of our products
Write us for anything in this line you may require.

MITCHELL-RAND M'F'G CO.
103 John St., New York City

See the Crank of the
CREAGHEAD DESTINATION SIGN

By means of it, conductor or motorman can change sign without leaving platform. All that has to be done is to turn the crank. Better investigate.

CREAGHEAD ENGINEERING CO., CINCINNATI, O.

The subscription was discontinued because a "Want" advertisement brought results

Editor—"We are sorry to lose your subscription, Mr. Jackson. What's the matter? Don't you like our politics?"

Mistah Jackson—"'Tain't dat, sah; 'tain't dat. Mah wife jes' been an' dun landed a job o' wuk for me by advertisin' in youh darned ole papah."

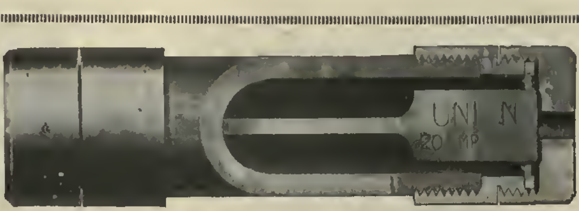
If you're looking for a "job o' wuk"—

If you're looking for a competent man who will be able to handle a big or a little "job o' wuk" and want RESULTS—

—there is no more efficient or economical method of securing either than the insertion of a card in the

SEARCHLIGHT
SECTION

32



The Proof of the Pudding—

Let the actual performance of *"Union" Renewable Fuses* tell its own story.

Try them out in your plant for thirty days. If you don't find that they are longest-lived ***simplest*** and most economical—return them to your dealer, who is authorized to refund your money.

Sold by all dealers in electrical supplies

Chicago Fuse Mfg Co.

Manufacturers of *Renewable Fuses*
Chicago **New York**

The McLain No. 25 Headlight

gives powerful road illumination, at the same time eliminating glare. It is an extended dash type light made of Pressed Steel throughout, assuring light weight without any sacrifice in strength or durability. It is absolutely waterproof, weather proof and solid.

Concentrated filament type using either a 23 or 36 watt lamp.

It's the LIGHTEST, BRIGHTEST, TIGHTEST headlight on the market and it doesn't cost any more than the others.

The Trolley Supply Co., Canton, Ohio

Armature and Field Coils—Armatures Rewound

**Commutators Refilled
Prompt Service**

THE KING-COIL MFG. CO., CLEVELAND, OHIO

RAILWAY UTILITY COMPANY

Sole Manufacturers
"HONEYCOMB" AND "ROUND JET" VENTILATORS
for Monitor and Arch Roof Cars, and all classes of buildings; also
ELECTRIC THERMOMETER CONTROL
of Car Temperatures.

141-151 WEST 22D St.
Chicago, Ill.

Write for Catalogue

1328 BROADWAY
New York, N. Y.

Have You Low Clearance Conditions?

Our No. 4 Ball Bearing Base overcomes this difficulty. When pole is in horizontal position, top of base is but 2¾ in. from car roof.

Measures 16 in. in diameter and contains 42 1-in. steel balls.

Our feature of taking the current through means of a swivel cable connection at the bottom, combined with the copper strips over the ball race, eliminates current passing through the balls, thereby overcoming the pitting of the balls so frequently found in bases of this kind.

Order a No. 4 Base and test it under all conditions. If not satisfactory return it for full credit.

The Holland Trolley Supply Co.
1623 East 43rd Street, Cleveland, Ohio

PERLEY A. THOMAS
CAR WORKS

Manufacturer of Cars
and Car Materials

Cars of all types from one-man to large interurban

HIGH POINT, N. C.

SASHES, DOORS
INTERIOR FINISH
VESTIBULES AND FRAMING

CURTAINS, VENTILATORS
SASH AND DOOR TRIMMINGS
DOOR AND STEP MECHANISM

'If there is anything you want—

or something you don't want that *other* readers of this paper can supply—or use—advertise in the

Searchlight Section

NOW— is the time to offer good second-hand equipment or machinery for sale. The demand is great for good plant for immediate delivery. That's why you should advertise NOW.

NOW— or any other time, use the Searchlight Section for advertising

Agencies Wanted
Agents Wanted
Auction Notices
Buildings For Sale
Business Opportunities
Civil Service Opportunities
Contracts To Be Let
Contracts Wanted
Educational Courses
Employment Agencies
Exchanges
For Rent Items
Franchises
Industrial Sites
Miscellaneous Wants
New Industries Wanted
Partners Wanted
Patents For Sale
Patent Attorneys
Plants For Sale
Positions Vacant
Positions Wanted
Property For Sale
Receivers' Sales
Representatives Wanted
Salesmen Wanted
Work Wanted
Etc., Etc., Etc.

35

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.

THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

Wheel Condition No. 1

When only the inner portion of the tread needs grinding — here's the style of

Pat. May 31, 1898; Sept. 1, 1903; Aug. 2, 1904; Dec. 29, 1908; June 15, 1909; April 21, 1914.

WHEEL TRUING BRAKE SHOE

that will correct the difficulty without removing the car from service.
We have a shoe to fit any style of head any sized wheel.

Wheel Truing Brake Shoe Co.
DETROIT MICHIGAN

McGuire-Cummings Mfg. Company

General Offices: 111 West Monroe St., Chicago

City and Interurban Cars and Trucks,
Snow Sweepers and Plows,
Express, Combination and Work Cars,
Electric Locomotives

VAN DORN COUPLERS

are made for every condition and requirement. M. C. B. Pin and Link, Car and Air, in all sizes and types.

VAN DORN COUPLER CO.
2325 So. Paulina St., Chicago, Ill.

Eight Hundred and Twenty-three Equipments of N L Indicating Tail-lights Sold During the Year 1918

2323 Cars now equipped and the motormen in Cleveland, Toledo, Philadelphia, Akron and St. Joseph say it is the best thing ever put on a car to promote safety and economy.

THE NICHOLS-LINTERN COMPANY, Cleveland, Ohio, U. S. A.

SEARCHLIGHT SECTION

ROTARY CONVERTERS

1—300-kw. Westinghouse Rotary Converter, 3-ph., 60-cy., 370-v. A.C., 575-v. D.C., 600 r.p.m.

3—300-kw. General Electric, 3-ph., 60-cy., 600-v., 1200 r.p.m. Rotary Converters with transformers.

TURBINE

1—500-kw. Westg. Horizontal, 3-ph., 60-cy., 370-v. (can be rewound for any standard voltage), 3600 r.p.m., with or without condensing equipment.

ARCHER & BALDWIN, Inc.
114-118 Liberty St., New York, N.Y. Telephone 4337-4338 Rector

SEARCHLIGHT
SERVICE
SECURES
SATISFACTORY
SITUATIONS
SALES

816

10,000 Kw.
Turbo-Generating Unit

Absolutely New

10,000 Kw. Westinghouse-Parsons Horizontal Turbo - Generator Unit, 3 phase, 60 cycle, 13,800 volts, 1800 R.P.M. Can be reconnected to any other standard voltage.

Suitable surface Condenser and Condenser Auxiliaries.

Send for full details and specifications

MacGovern & Co., Inc.
114 Liberty St., New York, N. Y.
Pittsburgh Office: 498 Union Arcade Bldg.

RAILS

15,000 TONS—NEW and RELAYERS
NEW—12 lb., 16 lb., 20 lb., 25 lb., 30 lb., 40 lb., 60 lb., 70 lb., 75 lb., 80 lb., 85 lb., 90 lb.

RELAYERS—30 lb., 35 lb., 40 lb., 45 lb., 56 lb., 60 lb., 70 lb., 80 lb., 85 lb., 90 lb., 100 lb.

Fastenings, New Bolts, Nuts and Spikes. New Frogs, Switches, Crossings and all accessories. Carload and less carload inquiries and orders a specialty. Rails cut to lengths for structural purposes. Attractive prices. Immediate shipments from stock.

L. B. FOSTER COMPANY
Park Bldg., Pittsburgh, Pa.

RATES:

I inch—$3.00
4 inches— 2.90 an inch

(The above rate applies to a 4-inch space in one issue, a 2-inch space in two issues, or a 1-inch space in four issues. The larger spaces following may be used up in a similar way.)

8 inches—$2.80 an inch
15 inches— 2.70 an inch
27 inches— 2.60 an inch
50 inches— 2.55 an inch

Rates for larger spaces furnished on application.

FOR IMMEDIATE DELIVERY

MOTOR GENERATORS

1—3-unit M. G. Set, consisting of 150-hp. Induction Motor, Type I, Form L, 2300-volt, 3-phase General Electric, driving 2 D.C. Generators, Type C.L., Form A, speed 600-volts, 230 each,

1—2-unit M.G. Set as follows: Induction Motor Type 1, Form K, 60-cycle, 220-hp., 2080-volts, 514-r.p.m., and 1—Generator, Type C, Class 6-150-600, Form B, amperes 273, speed 500 volts, 55 G. E.

FREQUENCY CHANGER

1—Frequency Changer, consisting of the following, all on common cast iron bed plate:

Synchronous Motor, Type A.T.B., Class 10-600-300, Form C, 800-hp., 300-r.p.m., volts 9000, amperes 38.5, cycles 25.

A.C. Generator, Type A.T.B., Class 24-500-300· Form C, volts 4150, amperes 70, speed 300. All General Electric.

1—Frequency Changer, consisting of the following all on common cast iron bed plate:

Synchronous Motor, Type A.T.I., 10-530-300 Form C, 710-hp., speed 300, volts 4000/2300. amperes 81, 25 cycles.

A.C. Generator, Type A.T.I., 24-500-300 Form C, 500-kw., speed 300, volts 4000/2300 amperes 70.

M. B. SMYTHE
30 Church Street, New York City

CAR BARGAINS

OPEN and CLOSED
MOTOR and TRAIL

Write for Price and Full particulars to

ELECTRIC EQUIPMENT Co.
601 Commonwealth. Bldg. Phila. Pa.

STREET CARS

3—32 ft. Closed

Complete with equipment. *First-Class.* Could be converted to one-man type.

4—9 Bench Open Trailers

Immediate Shipment.

Send for new Bulletin No. 247 for other bargains. What have you FOR SALE?

ZELNICKER IN ST. LOUIS
Rails, Power Plant Equipment, Machinery, etc.

RAILWAY MOTORS

Will sell or trade for old motors or other material

82—General Electric, No. 202, interpole, 40-hp. at 500 volts, 50-hp. at 600 volts. Complete with gears, pinions, gear cases, axle bearings, etc. Gearing, G. E. Grade M, heat treated; ratio 15-71; Gear Cases, malleable iron. Bearings are oiled from top.

Excellent Condition. **Low Price.**

4 G.E. .... .51-80 H.P.
12 G.E. ......52-30 H.P.
8 G.E. ......54-30 H.P.
2 G.E. ......55-80 H.P.
28 G.E. ......57-50 H.P.
42 G.E. ......67-40 H.P.
20 G.E. ......216 New
64 G.E. ....1000-35 H P.

20 Whs. 12A....30 H.P.
46 Whs. 49......35 H.P.
32 Whs. 56......50 H.P.
12 Whs. 68......40 H.P.
16 Whs. 76......75 H.P.
16 Whs. 302.....125 H.P.
10 Whs. 306......75 H.P.
12 Whs. 333.....115 H.P.

ARMATURES CONTROLLERS CARS

TRANSIT EQUIPMENT CO.
501 Fifth Ave., New York

Fare Registers

FOR SALE

One lot—Sterling No. 5
One lot—Sterling No. 12
One lot—Sterling No. 15

Above in condition equal to new.

One lot—New Haven Round Single
One lot—New Haven Square
One lot—Sterling No. 1
One lot—Meaker-1894 Model
One lot—Security (St. Louis)
One lot—Lewis and Fowler
One lot—Square Recording

All above in first class condition.

Repair Parts for Registers.

Repairing at Short Notice.

EXELL MANUFACTURING CO.
NEW HAVEN, CONN.

FOR SALE

1—6600-Volt, 3-Phase

Aluminum Cell Lightning Arrester for Outdoor Service

2—6600-Volt, 3-Phase

Aluminum Cell Lightning Arrester for Indoor Service

Each one complete with fuse block and charging mechanisms. Made by G. E. Co. Ready for service. Bargain price. Address

J. E. Lebow, P. A.
Knoxville Railway & Light Co.
Knoxville, Tenn.

Complete Railroad Siding
90-lb. A. S. C. E. Rail

1—No. 10 Turnout with necessary straight and curved rails.

All of Bethlehem manufacture and new—never used—details below:

1—No. 10 Stiff Bolted Frog, 15 ft. long.
1 pair std. gage Switch Points, 16 ft. 6 in. long, with all accessories.
1—New Era Switch Stand, Model 49.
2—12-ft. Guard Rails, with chocks and bolts.
24 pcs. 90-lb. Open Hearth Rail, 33 ft. lengths.
1 pc. 90-lb. Open Hearth Rail, 23 ft. 9 in. length.
1 pc. 90-lb. Open Hearth Rail, 23 ft. 8 in. length.
1 pc. 90-lb. Open Hearth Rail, 18 ft. 5 in. length.
1 pc. 90-lb. Open Hearth Rail, 11 ft. 8 in. length.
27 pairs 90-lb. Angle Splice Bars.
4 pairs Compromise Joints, 90 to 80 lb.

Immediate delivery—Price on Application.

E. C. SHERWOOD
50 Church Street, New York

CLEVELAND ARMATURE WORKS
Cleveland, Ohio

Everything in the Line of Repairs to Electrical Machinery

Complete Armatures, New Armatures, Rewound Armature Cores, Armature Shafts, Armature Coils, Fields and Commutators.

Established 22 Years

Armature Coil Taping Machine

Saves Time, Labor and Money

A boy can tape 40 coils for Westinghouse 12A Armature in an hour. Further particulars gladly furnished.

Geo. M. Griswold Machine Co.
New Haven, Conn.

FOR SALE

1000 tons of 80 lb.

RELAYING RAILS

Good as new, with angle bars.

For Immediate Shipment

R. C. HOFFMAN & CO.
Baltimore, Md.

TROLLEY WIRE

Hard drawn, round

22000 lb. 00 B. & S. A. S. & W.
28000 lb. 000 B. & S. A. S. & W.
Also 4000 lb. No. 8, B. & S. A. S. & W.

ZELNICKER IN ST. LOUIS

Get Bulletin 250—68 pages Bargains
Rails, Cars, Locomotives, Machinery, Piling.

Keep your eye on the Searchlight and your advertisements in it.

FOR SALE
8—G. E. 54

MOTORS

Complete with gears, pinions, gear cases, axle bearings, etc., good operating condition, very low price.

TRANSIT EQUIPMENT COMPANY
501 Fifth Ave., New York

FOR SALE

250 Brill four compartment

Fare Boxes

second hand but in good operating condition. Each box has two tills. Price $40 each, f.o.b. cars Pittsburgh, Pa. Subject to prior sale or other disposition. Any reasonable counter offer will be considered.

Pittsburgh Railways Company
Receivers
B. J. Yungbluth, *General Storekeeper*
Pittsburgh, Pa.

FIRST Get Bulletin 250—or, Wire

ZELNICKER IN ST. LOUIS

Before buying or selling

RAILS

Locomotives—Cars—Tanks
Machinery, Piling, etc.
What have you for sale?

The Searchlight Advertising In This Paper

is read by men whose success depends upon thorough knowledge of means to an end—whether it be the securing of a good second-hand piece of apparatus at a moderate price, or an expert employee.

The Best Proof

of this is the variety of this journal's Searchlight ads. Without a constant and appreciable *demand* for such machinery or services, by its readers, the market-place which these advertisements represent could not exist for any length of time.

Are *you* using the Searchlight Section?

POSITIONS VACANT

ASSISTANT superintendent of overhead on a city and interurban property, operating 200 miles of track, in the Middle West. Must be thoroughly acquainted with maintenance and construction of trolley and transmission lines. Good salary. Give experience and references. P-304, Elec. Ry. Journal.

ONE transformer repairman wanted, Ft. Dodge, Des Moines & Southern Ry., Boone, Iowa.

THE following experienced men wanted:
1 Controlled Inspector....$6.60 per day
Controller Overhauler... 6.60 per day
1 Air Brake Overhauler.. 7.15 per day
Good working conditions and opportunity for advancement. P-313, Elec. Ry Journal, Philadelphia.

POSITIONS WANTED

ELECTRICAL-mechanical engineer now in the army desires position as superintendent of equipment of electric railway or technical assistant to general manager. 15 years in electric railway and related work. Experience in construction, operation of equipment, valuation and reports on the economy of equipment used on a property. PW-310, Elec. Ry. Journal.

ELECTRICAL engineer, railway specialist, is open for engagement for $5000 position, paying $3500 to start. Expect to be free about February first. PW-314, Elec. Ry. Journal.

GENERAL manager or assistant to busy executive. 20 years practical experience. Thoroughly competent. Can bring up run down property at minimum expenses. Economical operator. Bond in any amount. Best of reasons for desiring change. Exceptional references. PW-312, Elec. Ry Journal.

GENERAL superintendent of city and interurban railway desires position in city of over 50,000. Present location too small. Highest recommendations from past and present employers. PW-318, Elec. Ry. Journal, Chicago.

SUPERINTENDENT or manager of electric railway, technically trained, 40 years of age, 14 years experience, construction, operation, engineering and appraisal. Good executive, successful with men. Not afraid of work. Now employed supt. of complete operation. Will let results tell the story. PW-311, Elec. Ry Journal, Chicago.

AGENTS AND SALESMEN

Salesman Wanted

Nationally known paint and varnish manufacturer with established business wants salesmen to handle railway and street railway trade in New York, Philadelphia and Chicago territories. Men must have standing and acquaintance, and ability to produce in big way. State qualifications, previous experience, salary expected, age, and references. AS-319, Elec. Ry. Journal, Leader-News Bldg., Cleveland.

In Replying to "Blind" Ads

be careful to put on envelope the key number in the ad. and also local address of office to which reply is sent.

10th Ave. at 36th St., New York.
935 Real Estate Trust Bldg., Phila.
657 Leader-News Bldg., Cleveland.
1570 Old Colony Bldg., Chicago.
519 Newhouse Bldg., Salt Lake City.
501 Rialto Bldg., San Francisco.

Important

Original letters of recommendation or other papers of value should not be enclosed to unknown correspondents—send copies.

5000 HP. Approx. Jones Patented Under Feed

Stokers

A1 physical and mechanical condition—Discontinued from service only on account of increased Stoker capacity per boiler required

PAUL STEWART & CO.
Electrical & Steam Machinery
First National Bank Bldg., Cincinnati, O.

WANTED

A TECHNICAL WRITER

familiar with electric railway operation.

P-316—Electric Railway Journal
935 Real Estate Trust Bldg., Philadelphia, Pa.

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Acetylene Service and Apparatus.
- Oxweld Acetylene Co.

Advertising, Street Car.
- Collier, Inc., Barron G.

Air Pressure Relays
- Philadelphia Electric Company Supply Dept., The

Air Rectifiers.
- Holden & White, Inc.

Anchors, Guy.
- Electric Service Supplies Co.
- Electrical Materials Co.
- Holden & White, Inc.
- Ohio Brass Co.
- Western Electric Co.
- Westinghouse Elec. & M. Co.

Anti-Climbers
- Railway Improvement Co.

Automobiles and Buses.
- Brill Co., The J. G.
- White Co.

Axle Straighteners.
- Columbia M. W. & M. I. Co.

Axles.
- Bemis Car Truck Co.
- Brill Co., The J. G.
- Carnegie Steel Co.
- National Railway Appliance Co.
- St. Louis Car Co.
- Standard Steel Works Co.
- Taylor Electric Truck Co.
- Westinghouse Elec. & M. Co.

Babbitting Devices.
- Columbia M. W. & M. I. Co.

Badges and Buttons.
- American Railway Supply Co.
- Electric Service Supplies Co.
- International Register Co., The.
- Western Electric Co.

Bankers and Brokers.
- Coal & Iron National Bank.

Batteries, Dry.
- Nichols-Lintern Co.
- Western Electric Co.

Batteries, Storage.
- Electric Storage Battery Co.
- Western Electric Co.

Bearings and Bearing Metals.
- Ajax Metal Co.
- Bemis Car Truck Co.
- Columbia M. W. & M. I. Co.
- Cosmic Metal Co.
- Eureka Co.
- General Electric Co.
- Kerschner Co., Inc., W. R.
- More-Jones Brass & M. Co.
- St. Louis Car Co.
- Taylor Elec. Truck Co.
- Westinghouse Elec. & M. Co.

Bearings, Center and Roller Side.
- Holden & White, Inc.

Bearings, Oil-less, Graphite, Bronze and Wood.
- Bound Brook Oil-less Bearing Co.

Bearings, Roller and Ball.
- Gurney Ball Bearing Co.
- Railway Roller Bearing Co.

Bells and Gongs.
- Brill Co., The J. G.
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- St. Louis Car Co
- Western Electric Co.

Benders, Rail.
- Niles-Bement-Pond Co.
- Reading Specialties Co.
- Watson-Stillman Co.
- Western Electric Co.
- Zelnicker Supply Company, Inc., Walter A.

Blasting Powder and Equipment.
- Du Pont de Nemours Co., E. I.

Boiler Tubes.
- National Tube Co.

Boilers.
- Babcock & Wilcox Co.

Boiler Setting
- Bernitz Method Co.

Bond Testers.
- American Steel & Wire Co.
- Lincoln Bonding Co.

Bonding Apparatus.
- Imperial Brass Mfg. Co.
- Lincoln Bonding Co.
- Ohio Brass Co.
- Oxweld Acetylene Co.

Bonding Tools.
- American Steel & Wire Co.
- Electric Service Supplies Co.
- Electrical Materials Co
- Ohio Brass Co.

Bonds, Rail.
- American Steel & Wire Co.
- Electrical Material Co.
- Electric Service Supplies Co.
- General Electric Co.
- Lincoln Bonding Co.
- Ohio Brass Co.
- Westinghouse Elec. & M. Co.

Book Publishers.
- McGraw-Hill Book Co.

Boring Tools, Car Wheel.
- Niles-Bement-Pond Co.

Brackets and Cross Arms. (See also Poles, Ties, Posts, Piling and Lumber.)
- Bates Expanded Steel Truss Co.
- Creaghead Engrg. Co.
- Electric Railway Equipment Co.
- Electric Service Supplies Co.
- Hubbard & Co.
- Lindsley Bros. Co.
- Ohio Brass Co.
- Western Electric Co.

Brake Adjusters.
- Holden & White, Inc.
- Westinghouse Trac. Brake Co.

Brake Shoes.
- American Brake S. & Fdy. Co.
- Barbour-Stockwell Co.
- Bemis Car Truck Co.
- Brill Co., The J. G.
- Columbia M. W. & M. I. Co.
- St. Louis Car Co.
- Taylor Elec. Truck Co.
- Wheel Truing Brakeshoe Co.

Brakes, Brake Systems and Brake Parts.
- Bemis Car Truck Co.
- Brill Co., The J. G.
- British Westinghouse Elec. & Mfg. Co.
- Columbia M. W. & M. I. Co.
- General Electric Co.
- Holden & White, Inc.
- National Brake Co.
- St. Louis Car Co.
- Safety Car Devices Co.
- Taylor Elec. Truck Co.
- Westinghouse Trac. Brake Co.

Brick, Fire
- Bernitz Method Co.

Brooms, Track, Steel or Rattan.
- Paxson Co., J. W.
- Western Electric Co.
- Zelnicker Supply Company, Inc., Walter A.

Brushes, Carbon.
- General Electric Co.
- Joandron, W. J.
- Morgan Crucible Co.
- United States Graphite Co.
- Western Electric Co.
- Westinghouse Elec. & M. Co.

Brushes.
- Whiting-Adams Co.

Brushes, Graphite.
- United States Graphite Co.

Brush Holders.
- Anderson Mfg. Co., A. & J. M.
- Eureka Co.

Buckets, Grab
- Beaumont Co., R. H.

Bunkers, Coal
- Beaumont Co., R. H.

Bushings, Case Hardened Manganese.
- Bemis Car Truck Co.

Bushings, Graphite and Wooden.
- Bound Brook Oil-less Bearing Co.

Cables. (See Wires and Cables.)

Cable End Bells
- Philadelphia Electric Company Supply Dept., The

Calculating Machines.
- Monroe Calculating Machine Co.

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc., see those Headings.)

Car Trimmings. (For Curtains, Doors, Seats, etc., see those Headings.)

Cars, Passenger, Freight, Express, etc.
- American Car Co.
- Brill Co., The J. G.
- Kuhlman Car Co., G. C.
- McGuire-Cummings Mfg. Co.
- Thomas Perley A.
- St. Louis Car Co.
- Wason Mfg. Co.

Cars, Second Hand.
- Electric Equipment Co.
- Ellcon Co.
- Kerschner Co., Inc., W. R.

Cars, Self-Propelled.
- British Westinghouse Elec. & Mfg. Co.
- Electric Storage Battery Co.
- General Electric Co.

Castings, Brass, Composition or Copper.
- Anderson M. Co., A. & J. M.
- American Steel Foundries.
- Columbia M. W. & M. I. Co.
- Eureka Co.
- More-Jones Brass & M. Co.

Castings, Gray Iron and Steel.
- American B. S. & Fdry. Co.
- Bemis Car Truck Co.
- Columbia M. W. & M. I. Co.
- St. Louis Car Co.
- Standard Steel Works Co.

Castings, Malleable and Brass.
- American Brake S. & Fdry. Co.
- Bemis Car Truck Co.
- Columbia M. W. & M. I. Co.
- St. Louis Car Co.

Catchers and Retrievers, Trolley.
- Earll, C. I.
- Electric Service Supplies Co.
- Holden & White, Inc.
- Kerschner Co., Inc., W. R.
- Ohio Brass Co.
- Trolley Supply Co.
- Wood Co., C. N.

Ceiling, Car
- Pantasote Co.

Chain and Belt Machinery
- Beaumont Co., R. H.

Checks, Employees.
- American Railway Supply Co.

Circuit Breakers.
- Electrical Materials Co.
- Cutter Co., The.
- General Electric Co.
- Western Electric Co.
- Westinghouse Elec. & M. Co.

Clamps and Connectors, for Wires and Cables.
- Anderson Mfg. Co., A. & J. M.
- Dossert & Co.
- Electric Railway Equipment Co.
- Electric Service Supplies Co.
- General Electric Co.
- Hubbard & Co.
- Ohio Brass Co.
- Western Electric Co.
- Westinghouse Elec. & M. Co.

Clamps, Insulator
- Philadelphia Electric Company Supply Dept., The

Cleaners & Scrapers, Track. (See also Snow-Plows, Sweepers and Brooms.)
- Brill Co., The J. G.
- Ohio Brass Co.
- Western Electric Co.

Cleat Type Switchboard Insulators
- Philadelphia Electric Company Supply Dept., The

Clusters & Sockets.
- General Electric Co.

Coal and Ash Handling. (See Conveying and Hoisting Machinery.)

Coasting Recorders
- Railway Improvement Co.

Coil Banding and Winding Machines.
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- Electrical Material Co.

Coils, Armature and Field.
- Cleveland Armature Works.
- Columbia M. W. & M. I. Co.
- D & W Fuse Co.
- General Electric Co.
- Independent Lamp & Wire Co.
- King-Coil Mfg Co.
- Westinghouse Elec. & Mfg. Co.

Coils, Choke & Kicking.
- Electric Service Supplies Co.
- General Electric Co.
- Westinghouse Elec. & M. Co.

Coin-Counting Machines.
- Electric Service Supplies Co.
- International Register Co.
- Johnson Fare Box Co

Commutator Slotters.
- Electric Service Supplies Co.
- General Electric Co.
- Westinghouse Elec. & M. Co
- Wood Co., C. N.

Commutator Truing Devices.
- General Electric Co.

Commutators or Parts.
- Cameron Elec'l Mfg. Co.
- Cleveland Armature Works.
- Columbia M. W. & M. I. Co.
- Electrical Material Co.
- Eureka Co.
- General Electric Co.
- King-Coil Mfg. Co.
- Western Electric Co.
- Westinghouse Elec. & M. Co.

Compressors, Air.
- Chicago Pneumatic Tool Co.
- General Electric Co.
- Westinghouse Traction Brake Co.

Condensers.
- General Electric Co.
- Westinghouse Elec. & M. Co.

Conduits
- Western Electric Co.

Conduits, Flexible
- Tubular Woven Fabric Co.

Conduits, Underground.
- Standard Underground Cable Co.

Connectors, Solderless.
- Dossert & Co.
- Westinghouse Elec. & Mfg. Co

Controller Regulators.
- Electric Service Supplies Co

Controllers or Parts.
- British Westinghouse Elec. & Mfg. Co.
- Columbia M. W. & M. I. Co.
- General Electric Co.
- Kerschner Co., Inc., W. R.
- Westinghouse Elec. & M. Co.

Controlling Systems.
- General Electric Co.
- Westinghouse Elec. & M. Co.

Converters, Rotary.
- General Electric Co.
- Western Electric Co.
- Westinghouse Elec. & M. Co.

Conveying and Hoisting Machinery.
- Beaumont Co., R. H.
- Columbia M. W. & M. I. Co.
- Green Eng'g Co.

Conveyors, Belt
- Portable Machinery Co.

Conveyors, Coal and Ash
- Portable Machinery Co.

Conveyors, Portable
- Portable Machinery Co.

Cord, Bell, Trolley, Register, Etc.
- Brill Co., The J. G.
- Electric Service Supplies Co.
- Electrical Material Co.
- International Register Co., The.
- Roebling's Sons Co., John A.
- Samson Cordage Works.
- Trolley Supply Co.

Cord Connectors and Couplers.
- Electric Service Supplies Co.
- Samson Cordage Works.
- Wood Co., C. N.

Couplers, Car.
- Brill Co., The J. G.
- Ohio Brass Co.
- Van Dorn Coupler Co.
- Westinghouse Trac. Brake Co.

Cranes. (See also Hoists.)
- Beaumont Co., R. H.
- Thew Automatic Shovel Co.
- Toledo Bridge & Crane Co., The
- Niles-Bement-Pond Co.

Creosoting. (See Wood Preservatives.)

Cross Arms. (See Brackets.)

Crossing Foundations.
- International Steel Tie Co.

Crossing Signals. (See Signals, Crossing.)

Crossings, Track. (See Track, Special Work.)

Culverts.
- American Rolling Mill Co.
- Bark River Bridge & Culvert Co
- California Cor. Culvert Co.
- Canada Ingot Iron Co., Ltd.
- Canton Culvert & Silo Co.
- Coast Culvert & Flume Co.
- Corrugated Culvert Co.
- Delaware Metal Culvert Co.
- Dixie Culvert & Metal Co.
- Hardesty Mfg. Co., R.
- Illinois Corrugated Metal Co.
- Independence Cor. Cul. Co.
- Iowa Pure Iron Co.
- Kentucky Culvert Mfg. Co.
- Lone Star Culvert Co.
- Lyle Corrugated Culvert Co.
- Maryland Cul. & Metal Co.
- Michigan Bridge & Pipe Co.
- Montana Culvert & Flume Co.
- Nebraska Culvert & Mfg. Co.
- New England Metal Cul. Co.
- Northeast Metal Culvert Co.
- Northwestern Sheet & I. Wks
- O'Neall Co., W. Q.
- Ohio Corrugated Culvert Co.
- Pennsylvania Metal Cul. Co.
- Road Supply & Metal Co.
- Sioux Falls Metal Cul. Co.
- Spokane Cul. & Tank Co.
- Tennessee Metal Culvert Co.
- U. S. Bridge & Culvert Co.
- Utah Corr. Cul. & Flume Co.
- Virginia Metal Mfg. Co., Inc.
- Western Metal Mfg. Co.
- Wyatt Metal & Boiler Works

Curtains and Curtain Fixtures.
- Brill Co., The J. G.
- Electric Service Supplies Co.
- Pantasote Co.
- St. Louis Car Co.

Cutting Apparatus, Oxy-Acetylene.
- Imperial Brass Mfg. Co.
- Oxweld Acetylene Co.

Model 341

A. C. and D. C. Voltmeter

One of the Portable Electrodynamometer Group, which also includes Model 310 Single Phase and D. C. Wattmeter, Model 329 Polyphase Wattmeter, and Model 370 A. C. and D. C. Ammeter.

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Only when you have studied the instrument question by direct comparisons will you realize fully what a high degree of efficiency and economy you can effect by selecting

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As soon as you inspect them—even before you subject them to the test of comparisons in actual use—the reasons for their acknowledged supremacy throughout the world will be apparent to you. These reasons are revealed in every structural detail.

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Winnipeg
Montreal
Vancouver
Halifax
Calgary, Alta.
London
Petrograd
Florence, Italy
Buenos Ayres
Copenhagen, Denmark
Johannesburg, S. A.
Mexico City
Calcutta
Rio de Janeiro
Valparaiso
Havana
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OFFICES: 1737 Broadway, New York
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WHAT AND WHERE TO BUY

Derailing Devices.
Cleveland Frog & Crossing Co

Destination Signs.
Columbia M. W. & M. I. Co.
Creaghead Engrg. Co.
Electric Service Supplies Co.
Western Electric Co.

Detective Service.
Wish Service, P. Edward

Disconnecting Switches
Philadelphia Electric Company Supply Dept., The

Dispatching Systems
Western Electric Co.

Door Operating Devices.
Consolidated Car Heating Co.
National Pneumatic Co., Inc.
Safety Car Devices Co.

Doors and Door Fixtures.
Brill Co., The J. G.
Hale & Kilburn Corp.

Doors, Folding Vestibule.
National Pneumatic Co., Inc.

Doors for Bus and Switch Compartments
Philadelphia Electric Company Supply Dept., The

Draft Rigging. (See Couplers, Car.)

Drills, Track.
American Steel & Wire Co.
Chicago Pneumatic Tool Co.
Electric Service Supplies Co.
Long Co., E. G.
Niles-Bement-Pond Co.
Ohio Brass Co.

Dryers, Sand.
Electric Service Supplies Co.
Zelnicker Supply Co., Inc., W. A.

Electrical Wires and Cables
Roebling's Sons Co., J. A.

Engineers, Consulting, Contracting and Operating.
Archbold-Brady Co.
Arnold Co., The.
Beeler, John A.
Byllesby & Co., H. M.
Ford, Bacon & Davis.
Republic Engineers Inc.
Richey, Albert S.
Sanderson & Porter.
Sargent & Lundy.
Scofield Engineering Co.
Sloan, Huddle, Feustel & Freeman
Stone & Webster.
White Companies, The J. G.
Woodmansee & Davidson Engineering Co.

Engines, Gas and Oil.
Westinghouse Elec. & M. Co.

Engines, Steam.
Westinghouse Elec. & M. Co.

Fare Boxes.
Brill Co., The J. G.
Cleveland Fare Box Co.
International Register Co. The
Johnson Fare Box Co
National Railway Appliance Co.
Ohmer Fare Register Co.

Fences, Woven Wire and Fence Posts
American Steel & Wire Co.
Page Steel & Wire Co.

Fenders and Wheel Guards.
Brill Co., The J. G.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Electric Service Supplies Co.
Root Spring Scraper Co.
Star Brass Works.
Trolley Supply Co.
Western Electric Co.
Wood Co., Charles N.

Fibre and Fibre Tubing.
Westinghouse Elec. & M. Co.

Field Coils. (See Coils.)

Filters, Water.
Scaife & Sons Co., Wm. B.

Fire-Extinguishing Liquid.
J. M. Castle Co.

Floodlights.
Crouse-Hinds Co.
Electric Service Supplies Co.

Flooring, Composition.
American Mason Safety T. Co.
Western Electric Co.

Forgings.
Columbia M. W. & M. I. Co.
Eureka Co.
Standard Steel Works Co.

Fuses and Fuse Boxes.
Chicago Fuse Mfg. Co.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Fuses, Refillable.
Columbia M. W. & M. I. Co.
Economy Fuse & Mfg. Co.
General Electric Co.

Gages, Oil and Water.
Ohio Brass Co.

Gaskets.
Johns-Manville Co., H. W.
Power Specialty Co.
Westinghouse Trac. Brake Co.

Gas-Electric Cars.
General Electric Co.

Gas Producers.
Westinghouse Elec. & M. Co.

Gates, Car.
Brill Co., The J. G.

Gear Blanks.
Carnegie Steel Co.
Standard Steel Wks. Co.

Gear Cases.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Kerschner Co., Inc., W. R.
Westinghouse Elec. & M Co.

Gears and Pinions.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co
Electric Service Supplies Co.
Electrical Material Co.
General Electric Co.
Kerschner Co., Inc., W. R.
National Ry. Appliance Co.
Nuttall Co., R. D.
Poole Engineering & Machine Co.

Gears, Reduction
Poole Engineering & Machine Co.

Generating Sets, Gas-Electric.
General Electric Co.

Generators.
Dick, Kerr & Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Gongs. (See Bells and Gongs.)

Graphite.
Morgan Crucible Co.

Grates, Chain.
Green Eng'g Co.

Greases. (See Lubricants.)

Grinding Blocks & Wheels
Railway Track-work Co.

Grinders and Grinding Supplies.
Indianapolis Switch & Frog Co.
Metal & Thermit Corp
Railway Track-work Co.
Western Electric Co.

Grounding Boxes
Philadelphia Electric Company Supply Dept., The

Guards, Trolley.
Electric Service Supplies Co.
Ohio Brass Co.

Harps, Trolley.
Anderson M. Co., A. & J. M.
Bayonet Trolley Harp Co.
Electrical Material Co.
Electric Service Supplies Co.
Hensley Trolley & Mfg. Co.
Holland Trolley Supply Co.
More-Jones Brass & M. Co.
Nuttall Co., R. D.
Star Brass Works
Western Electric Co.

Headlights.
Crouse-Hinds Co.
Electric Service Supplies Co.
Electrical Material Co.
General Electric Co
Ohio Brass Co.
St. Louis Car Co.
Trolley Supply Co.

Headlining.
Kerschner Co., Inc., W. R.
Pantasote Co.

Heaters, Car, Electric.
Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
Smith Heater Co., Peter.

Heaters, Car, Hot Air and Water.
Cooper Heater Co.
Smith Heater Co., Peter.

Heaters, Car, Stove.
Electric Service Supplies Co.
Smith Heater Co., Peter.

Hoists and Lifts.
Beaumont Co., R. H.
Columbia M. W. & M. I. Co.
Duff Manufacturing Co.
Ford Chain Block & Mfg. Co.
Niles-Bement-Pond Co.
Toledo Bridge & Crane Co., The
Yale & Towne Mfg. Co.

Hose Bridges.
Ohio Brass Co.

Hydraulic Machinery.
Niles-Bement-Pond Co.
Watson-Stillman Co.

Inspection.
Elec'l Testing Laboratories.

Instrument Cutout Switches
Philadelphia Electric Company Supply Dept., The

Instruments, Measuring, Testing and Recording.
Economy Electric Devices Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
Weston Elec'l Instrument Co.

Insulating Cloths, Paper and Tape.
Anchor Webbing Co.
Electrical Material Co.
General Electric Co.
Hope Webbing Co.
Irvington Varnish & Insulator Co.
Mitchell-Rand Mfg. Co.
Okonite Co.
Standard Paint Co.
Standard Underground Cable Co.
Standard Woven Fabric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Insulation. (See also Paints.)
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
Electrical Material Co.
General Electric Co.
Mitchell-Rand Mfg. Co.
Okonite Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Insulators. (See also Line Material.)
Anderson M. Co., A. & J. M.
Creaghead Engrg. Co.
Drew Elec. & Mfg. Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Electrical Material Co.
General Electric Co.
Locke Insulator Mfg. Co.
Macallen Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Insulator Pins.
Electric Service Supplies Co.
Hubbard & Co.

Insurance, Fire
Marsh & McLennan.

Inventions, Developed and Perfected.
Peters & Co., G. D.

Jacks. (See also Cranes, Hoists and Lifts.)
Brill Co., The J. G.
Buckeye Jack Mfg. Co.
Columbia M. W. & I. Co.
Duff Manufacturing Co.
National Ry. Appliance Co., Ltd.
Templeton Kenly & Co., Ltd.
Watson-Stillman Co.

Joints, Rail.
Carnegie Steel Co.
Lackawanna Steel Co.
Rail Joint Co.
Zelnicker Supply Co., Inc., W. A.

Journal Boxes.
Bemis Car Truck Co.
Brill Co., The J. G.
Gurney Ball Bearing Co.
Railway Roller Bearing Co.

Junction Boxes.
Standard Underground Cable Co.

Laboratories.
Elec'l Testing Laboratories.

Lamp Guards and Fixtures.
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Lamps, Arc and Incandescent.
Anderson M. Co., A. & J. M.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Lamps, Signal and Marker.
Nichols-Lintern Co.
Ohio Brass Co.

Lathes, Car Wheel.
Niles-Bement-Pond Co.

Lighting Regulators, Car.
Holden & White, Inc.

Lightning Protection.
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
Electrical Materials Co.
General Electric Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Line Material. (See also Brackets, Insulators, Wires, etc.)
Anderson M. Co., A. & J. M.
Archbold-Brady Co.
Columbia M. W. & M. I. Co.
Creaghead Engrg. Co.
Dick, Kerr & Co.
Dossert & Co.
Drew Elec. & Mfg. Co.
Electric Railway Equipment Co
Electric Service Supplies Co.
Electrical Material Co.
Eureka Co.
General Electric Co.
Holden & White, Inc.
Hubbard & Co.
Locke Insulator Mfg. Co.
Macallen Co.
More-Jones Brass & M. Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Liquid, Fire-Extinguishing
J. M. Castle Co.

Locks.
Yale & Towne Mfg. Co.

Locomotives, Electric.
Brill Co., The J. G.
General Electric Co.
McGuire-Cummings Mfg. Co.
Westinghouse Elec. & M. Co.

Lubricating Engineers.
Galena-Signal Oil Co.

Lubricants, Oil and Grease.
Borne, Scrymser Co.
Galena-Signal Oil Co.

Lumber. (See Poles, Ties, Posts etc.)

Machine Work.
Columbia M. W. & M. I. Co.
Holden & White, Inc.

Machine Tools.
Columbia M. W. & M. I. Co.
Niles-Bement-Pond Co.
Watson-Stillman Co.

Manganese Parts.
Bemis Car Truck Co.

Meters, Car, Watthour.
Economy Electric Devices Co.

Meters (See Instruments.)

Mica.
Macallen Co.
Mechanical Rubber Co.

Mirrors for Motormen.
Drew Elec. & Mfg. Co.

Motormen's Seats.
Electric Service Supplies Co.
Wood Co., C. N.

Motor Generator, Bonding and Welding.
Lincoln Bonding Co.

Motors and Generators Sets
General Electric Co.

Motors, Electric.
British Westinghouse Elec. & Mfg. Co.
Dick, Kerr & Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Nuts and Bolts.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Hubbard & Co.
Lackawanna Steel Co.

Oil Storage Systems
Gilbert & Barber Mfg. Co.

Oils. (See Lubricants.)

Overhead Equipment. (See Line Material.)

Oxy-Acetylene. (See Cutting Apparatus, Oxy-Acetylene.)

Packing.
Electrical Material Co.
Power Specialty Co.
Westinghouse Trac. Brake Co.

Paints and Varnishes. (Insulating.)
Holden & White, Inc.
Irvington Varnish & Insulator Co.
Mitchell-Rand Mfg. Co.
Standard Paint Co.

Paints and Varnishes. (Preservative.)
Standard Paint Co.

Paints and Varnishes for Woodwork.
National Railway Appliance Co

Paving Material.
American B. S. & Fdry. Co.

Pickups. (Trolley Wire.)
Electric Service Supplies Co.
Ohio Brass Co.

Pinion Pullers.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Wood Co., C. N.

Pinions. (See Gears.)

Pins, Case Hardened, Wood and Iron.
Bemis Car Truck Co.
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Trac. Brake Co.

Pipe.
National Tube Co.

Pipe Fittings.
Power Specialty Co.
Standard Steel Works Co.
Watson-Stillman Co.
Westinghouse Trac. Brake Co.

Pliers, Insulated.
Electric Service Supplies Co.
National Railway Appliance Co.

Pneumatic Hose.
Westinghouse Trac. Brake Co.

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Poles, Metal Street.
- Bates Expanded Steel Truss Co.
- Electric Railway Equipment Co.
- Electrical Material Co.
- Hubbard & Co.
- National Railway Appliance Co.

Pole Sleeves.
- Drew Elec. & Mfg. Co.

Poles, Ties, Posts, Piling and Lumber.
- Electrical Material Co.
- Lindsley Bros. Co.
- Valentine-Clark Co.
- Western Electric Co.
- White Marble Lime Co.

Poles and Ties, Treated.
- Lindsley Bros.
- Valentine-Clark Co.
- Western Electric Co.

Poles, Trolley.
- Anderson M. Co., A. & J. M.
- Bayonet Trolley Harp Co.
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- Electrical Material Co.
- Holland Trolley Supply Co.
- National Tube Co.
- Nuttall Co., R. D.

Pole Reinforcing.
- Hubbard & Co.

Poles, Tubular Steel.
- Electric Railway Equipment Co.
- National Tube Co.

Porcelain Bushings
- Philadelphia Electric Company Supply Dept., The

Post Type Insulators
- Philadelphia Electric Company Supply Dept., The

Potheads
- Philadelphia Electric Company Supply Dept., The

Protective Devices
- Philadelphia Electric Company Supply Dept., The

Power Saving Devices.
- Arthur Power-Saving Recorder Co.
- Railway Improvement Co.

Power Transmission Machinery
- Poole Engineering & Machine Co.

Presses, Transfer
- Meisel Press Mfg. Co.

Pressure Regulators.
- General Electric Co.
- Ohio Brass Co.
- Westinghouse Trac. Brake Co.

Pumps.
- Watson-Stillman Co.

Punches, Ticket.
- American Railway Supply Co.
- Bonney-Vehslage Tool Co.
- International Register Co., The
- Wood Co., C. N.

Punching Machinery.
- Watson-Stillman Co.

Purifiers, Feed Water.
- Scaife & Sons Co., Wm. B.

Rail Grinders. (See Grinders.)

Rails, Relaying.
- Zelnicker Supply Company, Inc., Walter A.

Rail Welding. (See Welding Processes and Apparatus.)

Rattan.
- Brill Co., The J. G.
- Electric Service Supplies Co.
- Hale & Kilburn Corp.
- McGuire-Cummings Mfg. Co.
- St. Louis Car Co.

Recorders, Power Saving.
- Arthur Power-Saving Recorder Co.

Registers and Fittings.
- Bonham Recorder Co.
- Brill Co., The J. G.
- Electric Service Supplies Co.
- International Register Co., The
- Ohmer Fare Register Co.
- Rooke Automatic Register Co.

Reinforcing Concrete.
- American Steel & Wire Co.

Repair Shop Appliances. (See also Coil Banding and Winding Machines.)
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.

Repair Work. (See also Coils, Armature and Field.)
- Cleveland Armature Works.
- Columbia M. W. & M. I. Co.
- General Electric Co.
- Independent Lamp & W. Co.
- King-Coil Mfg. Co.
- Westinghouse Elec. & M. Co.

Replacers, Car.
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- Reading Specialties Co.

Resistance, Grid.
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- Nichols-Lintern Co.
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- Thew Automatic Shovel Co.

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- Electric Service Supplies Co.
- Federal Signal Co.
- Nachod Signal Co., Inc.
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- Western Electric Co.
- Wood Co., C. N.

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- Electrical Material Co.

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- Columbia M. W. & M. I. Co.

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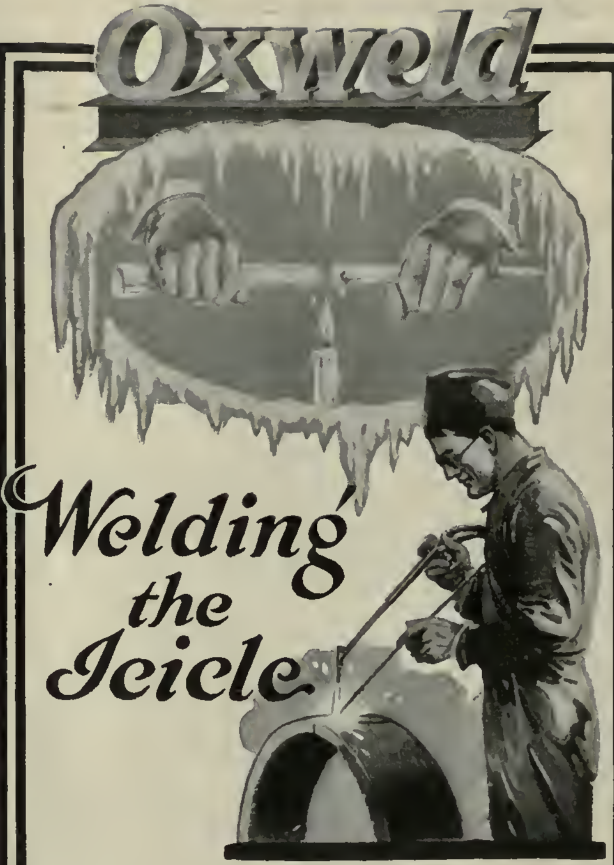

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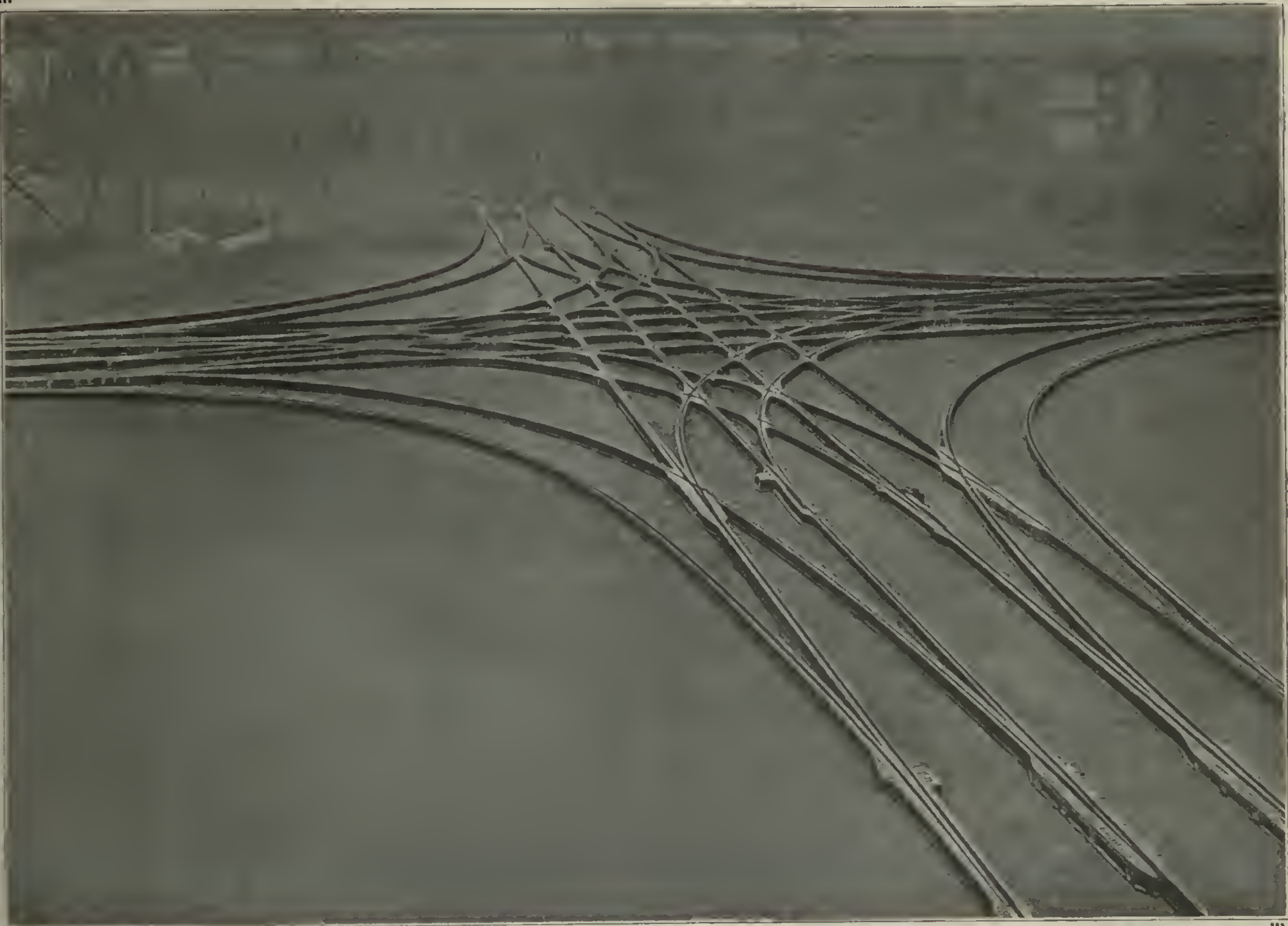

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January 11, 1919

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East Pittsburgh Pennsylvania

Vol. 53, *No.* 2 New York, January 11, 1919 *Pages* 81 *to* 124

Electric Railway Journal

H. W. BLAKE, *Editor*

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Despite higher costs of operation, municipal authorities demand old fares and more service. Municipally-owned lines are losing money. Service-at-cost plan, as adopted in Massachusetts, is being sought by Ontario investors. Résumé by Ernest P. Fredericks..Page 91

Skip-Stop Operation Furthers Safety Movement

Records from Detroit are quoted by E. J. Burdick to show that the skip stop means greater safety to the passenger as well as to the vehicle and pedestrian on the street. The data are shown graphically and cover 1916, 1917 and 1918..Page 97

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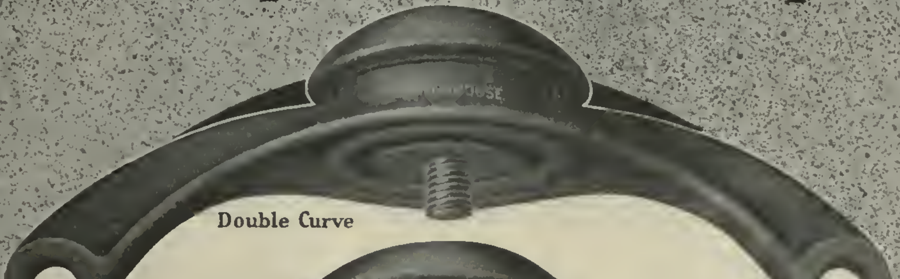

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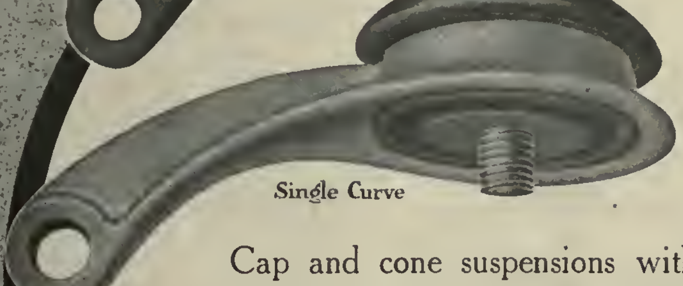

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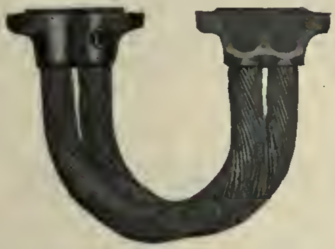

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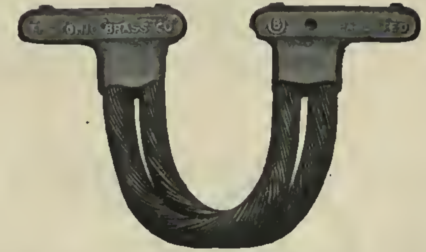

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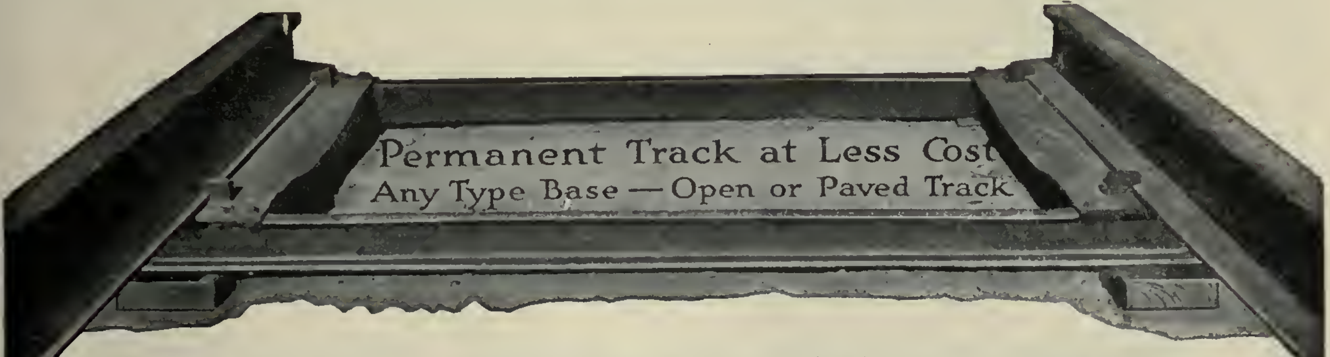
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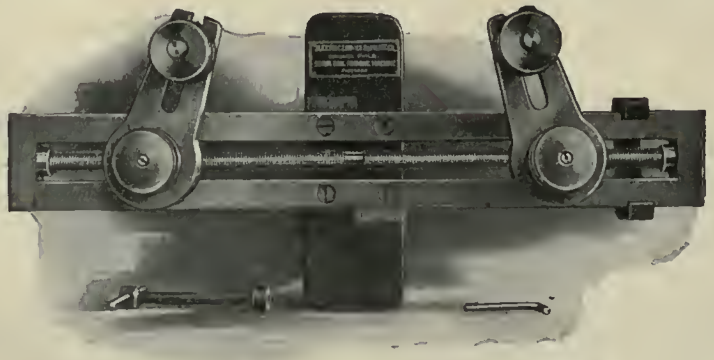

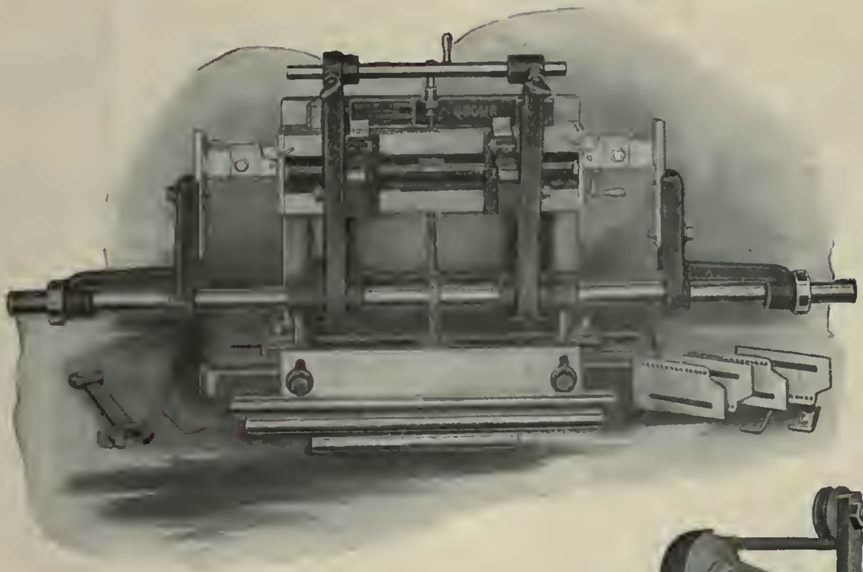

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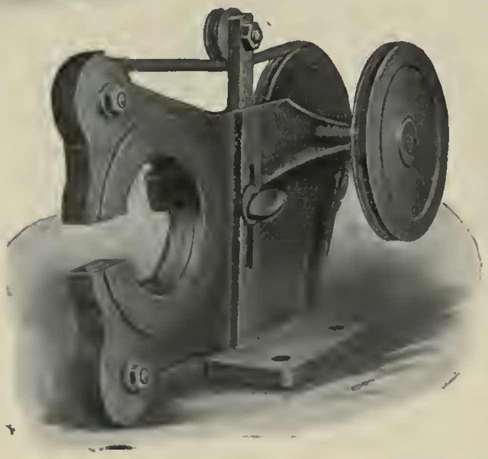

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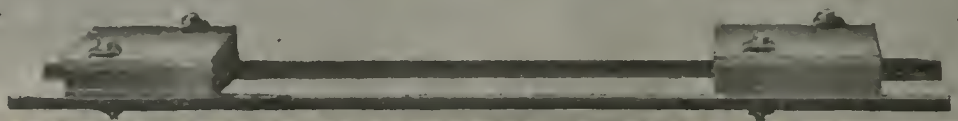
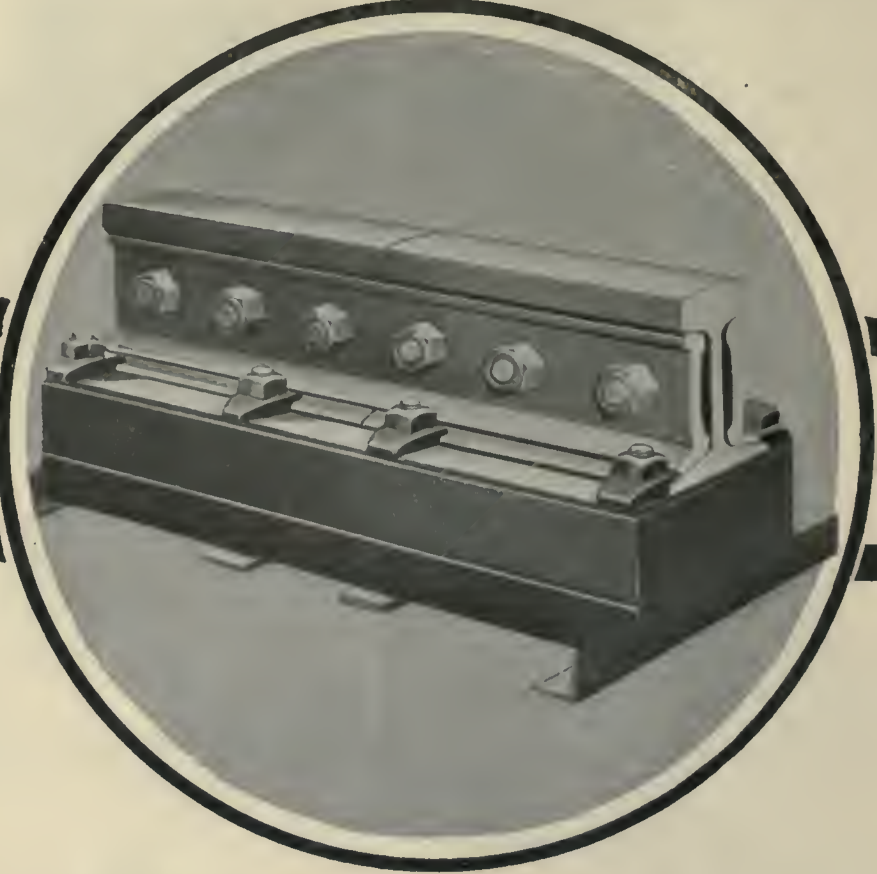
DMT Co





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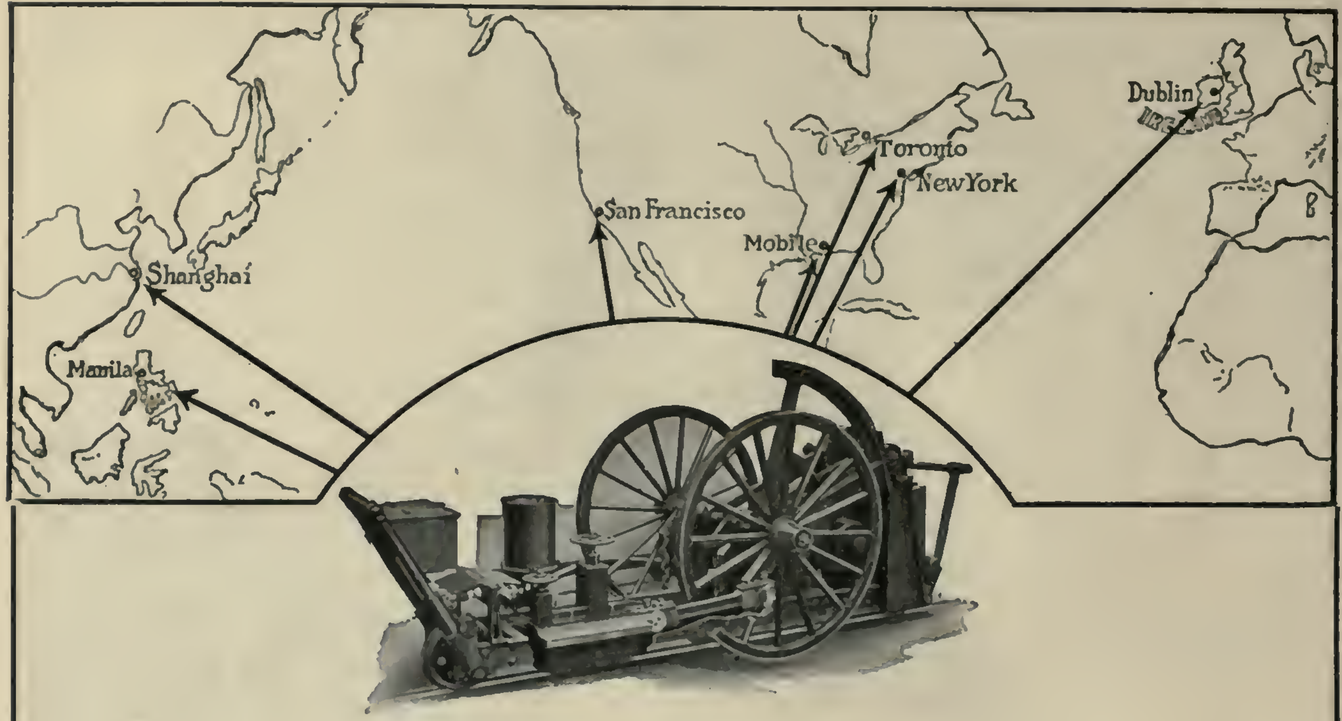

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Whatever the general conception may be with regard to track grinding equipment, *this* fact is solidly established. Nearly one hundred electric railway companies in the United States and foreign countries are regularly using

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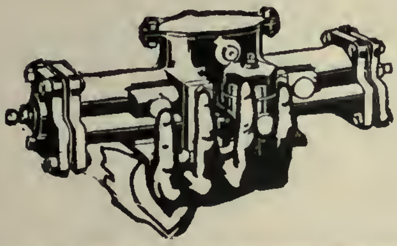

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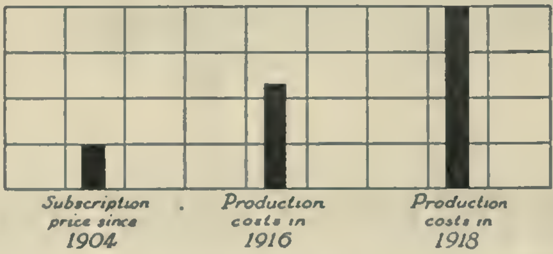

These lines tell the story

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The processes used in producing

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are just as much a mystery to those who have tried to imitate these lubricants as was the co-ordination of the horses' muscles to David Gordon—and for much the same reason.

It is known, for instance, that in treating Galena Oils a process is employed whereby *lead* is permanently emulsified with petroleum oils.

The fundamental principle on which this emulsifying process is based has, however, baffled those who have attempted to produce imitations of Galena Oils. Therefore, oils have yet to be produced to equal Galena lubricants in efficiency and economy.

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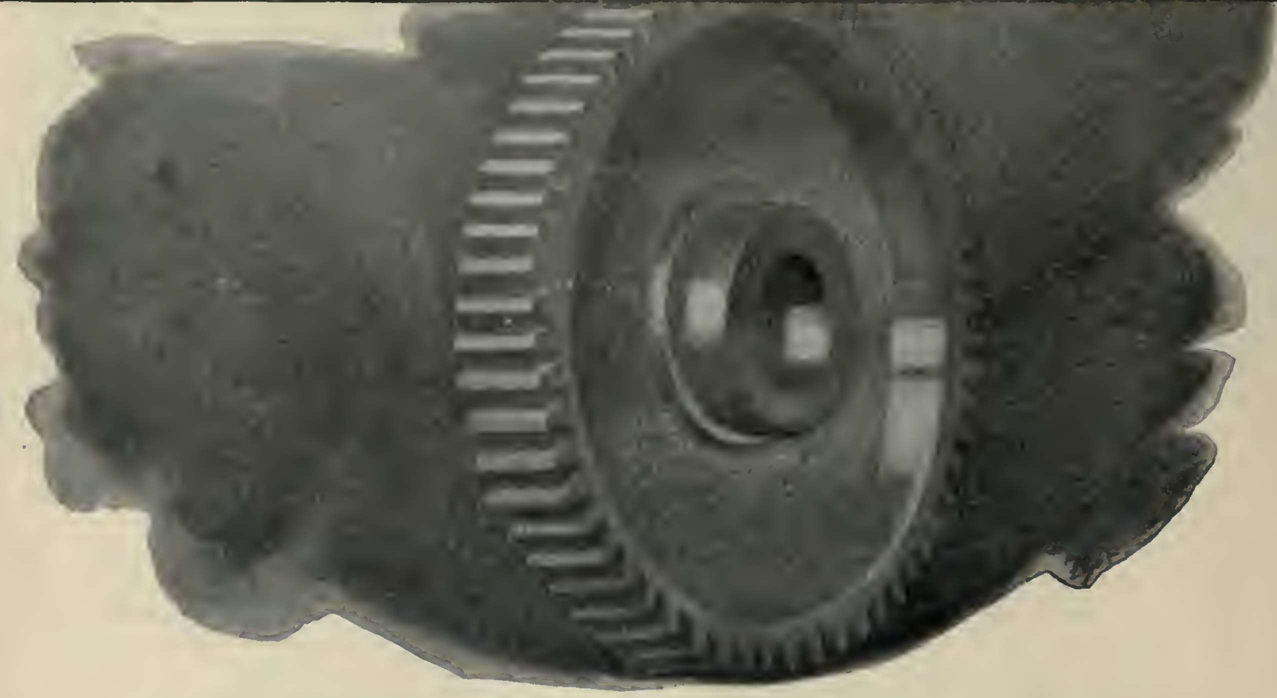
War restrictions on rolling mills being removed, we are again securing, with pre-war promptness, forged blanks for the famous Grade M Gearing.



Grade M Gears, too, have served

During the period of the war when conservation was a prime necessity, electric railways appreciated the long-lasting qualities of their

Grade M

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General Electric Company

General Office Schenectady, N.Y.

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Electric Railway Journal

Consolidation of STREET RAILWAY JOURNAL and ELECTRIC RAILWAY REVIEW

Volume 53 New York, Saturday, January 11, 1919 *Number* 2

Skip Stops Demand Better Car Signs

MANY American operators do not fully appreciate the revenue and public-satisfaction value of destination and route signs that can be read by the would-be passenger for the length of an ordinary city block, say one-fifteenth or one-twentieth of a mile. Now with the coming of the skip stop, the need for such signs is all the greater because with the longer distance between stops, the car is going at a good rate of speed while it is one block away from the next permissible stop instead of being at a standstill. If the man in the street cannot make out the sign, he will either signal for an unnecessary stop or else start to walk. The latter action is more likely if he is only a mile or so from his destination. Since it cannot be denied that the skip stop has a tendency to discourage short riding, it would be a serious mistake to accelerate that tendency by continuing the use of car signs that are indistinct both night and day. It is so easy to use conspicuous initial or route number signs as an identification to the native rider at least, that further retention of wooden block and ground-glass monitor lettering is inexcusable.

If You Can't Buy, Try Installments or Rental

WHEN the maker of a money-saving or money-earning device has convinced the railway prospect that he is telling the truth and nothing but the truth, the latter will often throw up his hands, expel a heart-felt sigh and say: "I guess you're right old man, but where in Helvetia can I get the money for your stuff?" If the salesman at this point can go no further than a sincere expression of sympathy, both the sale and the savings are off.

It may be a misfortune, but it is certainly necessary in many instances for the manufacturer to finance the customer by taking his payments in long-time installments or in rentals. Although this means a higher initial cost than outright cash purchase, there is an important advantage in that the manufacturer has the strongest possible incentive to make good because he will not get his money until the customer is satisfied. This policy, of course, works out most logically with devices that need personal instruction, enthusiasm and follow-up to be a success, such as fare-collection and car-checking instruments. If the latter are sold outright, the customer is too prone to make no allowance for these very factors that bring him the highest returns.

When asked for the secret of the perfect blending of the paints in the pictures which he produced, the great Reynolds replied that he mixed his paint with brains. So, too, the makers of efficiency devices also have had to mingle brains with metals and mechanisms. Therefore, they cannot sell their apparatus at a manufacturing profit over the cost of their copper and steel as does the maker of a stock article. They must charge a figure that includes both inventive ability and continuing service to the buyer. Surely, if such manufacturers have the faith that the money for long credits or rentals can be made directly out of savings, the electric railway manager should show equal faith in accepting such opportunities in the helpful spirit in which they are made.

Solve This Business Problem in a Business Way

ONE of the tangible results of the recent reconstruction conference at Atlantic City, held under the auspices of the United States Chamber of Commerce, was the passage of a resolution calling for the appointment of a committee of the chamber "to investigate and study the question of local transportation as it relates to the control of rates and service, franchises, taxes, the attraction of capital into the business, and such other questions which the committee may find pertinent." The scope of the investigation is national in character, and, for its decision to carry the greatest weight, we believe that the members of the proposed committee should be of national standing.

The leaders of the Chamber of Commerce of the United States who have to do with the naming of committees could serve the public interest well if, in appointing this particular committee, they select men capable of broad-gage views and conclusions, with a good knowledge of public relations, as well as some contact with power and electric railway companies. The type of man who should come last in the list of those to be named on the committee is the public utility official who is that and no more.

The war has taught us to think in terms of the public utility industry rather than in terms of special interests in the industry. A consciousness has been aroused among public utility men that they are part of a great national industry instead of being merely officials of local plants and local industries. Public utility men themselves are now beginning to understand this, and they should be the first to come forward and urge that there should be named on the committee, for instance, men such as the following: the president of a great life insurance company—any one of them—in view of the fact that the big insurance companies are owners of from $250,000,000 to $300,000,000 worth of public utility securities; the president or general manager of a great industrial plant using power and local transportation which suffered and which thereby caused industrial war production to suffer during the war because of the lack of power and local transportation; leaders, such as one who sprang to the rescue in Boston, in the organization of street railway and power company security owners; and last but not least, some representative of the public utilities who has been closely in touch with the industry in a national way during recent years and knows its problems.

A big, broad-gaged committee, which touches at all points the public, namely, the users and the owners, rather than the operators, of the public utilities is what is needed for this work. It could do much to advance the prosperity of the country through the improvement of its local transportation systems.

New York Situation Looks Somewhat More Hopeful

THE New York City situation appears a little more hopeful as a result of the events of the past week. The appointment of a receiver for the Brooklyn Rapid Transit Company and the frank statements from Mr. Shonts of the deplorable condition of the Interborough and New York Railways lines under a 5-cent fare have brought a realization to the public that something must be done. A special feature of the case is that with both the B. R. T. and the Interborough, under the dual subway agreement, the companies are entitled to preferential treatment in the division of the income of the rapid transit system. But the new lines are not yet paying—indeed, are not yet completed—and the rise in operating expenses has robbed the 5-cent fare of its profit and the companies of their ability to finance themselves until things again become normal. The acceptance by Mr. Garrison, formerly secretary of war, of the Brooklyn receivership has installed confidence that the interests of the company will be well cared for, and the treatment of the traction crisis in the press is generally sympathetic. This is considered indicative that the city may be brought to consider some service-at-cost or other plan under which the subway extensions may be completed as proposed and the integrity of the traction properties may be preserved.

The obvious immediate step to be taken is an advance in fare. It is a notable fact that although New York provides the most expensive electric railway construction per mile of track of any city in the country and probably the longest ride for a single fare, it is among the very few cities left which have not permitted an increase in the fare from that which existed before the war. The admission of Comptroller Craig that under municipal ownership fares would have to be raised shows the justice of the demand that they be increased now. The whole theory of the modern public service corporation is that it is entitled to a reasonable return. New York City ought not to run the risk of such obloquy as will surely always attach to it if it deliberately witholds a living fare from properties which up to the outbreak of the war were prosperous and paying dividends. It is running such a risk by employing the tactics which have brought the local railways to their present pass.

"Hooverize" Time by Cutting Out Unnecessary Delays

IN A Middle Western city recently an electric railway company found it necessary to indicate the new stopping places under a skip-stop system by suspending the signs from the overhead wires. These signs were placed at locations exactly over the spot where persons were expected to board the cars. The resulting time saving from having the people wait at the proper distance from the street intersection was quite noticeable and had an appreciable effect on the scheduled movement of the cars. The change was especially worthy of comment because the same company previously had marked stopping places by signs on the nearest trolley poles, even though these supports happened to be 50 or more feet from the spot where persons were expected to board the cars.

We do not refer to this experience with the idea of recommending that all companies should change the location of stop signs, regardless of expense, where they do not happen to conform to this plan. We believe, however, that the incident is worthy of mention as showing how improved operation may result from a discovery brought about by the adoption of the skip-stop system.

The "man on the street" has no idea of the value of minutes, still less of seconds, as connected with railway operation. He is peeved perhaps when a car passes him by and causes a wait of two minutes or so for another. In fact, those two minutes are likely to measure up as a much longer period in his mind. This is what Doolittle calls one of the psychological aspects of street railway service. But he rarely thinks that the railway company is interested in saving time.

The thoughtful railway operator, however, has to give serious consideration to this factor in providing transportation, especially under crowded city conditions. That is why, for instance, he adopts a simple transfer system which eliminates, say, one punch mark even though a more elaborate form of transfer would safeguard the revenues more closely if the conductor had the time to punch every hole or look for every mark painstakingly. That is why there is a constant demand for quicker fare collection methods—especially now that more pennies are being handled. This accounts also for the continual effort toward the development of mechanical devices which will have a tendency to speed up the movement of the car.

When we consider how much thought is given by some officials to details of this kind, we may well wonder why no improvement is made to correct other conditions which should have a very strong tendency to accelerate traffic movement. Take, for instance, the matter of clearing the right-of-way from vehicular obstructions—and, as a necessary corollary in crowded districts, preventing the parking of automobiles along the tracks. Wonderful results are said to have been secured in this last particular in Chicago where the downtown streets formerly were impassable outside of the car tracks. Now, during the rush hours, this nuisance is practically eliminated, with a resultant time saving for every car passing through the "loop district."

These are only a few of the items to be considered in improving car service. Traffic studies made from time to time, such as the one reported for Dallas in our Dec. 7 issue, call attention to many similar instances where transportation facilities may be bettered. It is well to have such recommendations come from experts. The people are more likely to be impressed by such reports from disinterested sources. But, after all, no good can come of even the best traffic study unless it be followed by proper co-operation from the public and the local authorities. The trying times through which we are passing call for such co-operation.

Why the Automatic Substation Is Coming Into Its Own

EVERY technical development involves the balancing of rival financial and other considerations, true engineering being the selection of equipment and methods of operation which are in the long run most economical. This is well illustrated in the progress of electric railway power distribution. At first the electric power was generated and distributed in direct-current form for this purpose, but the distance to which it could be transmitted at the low voltage of 500 or 600 was so small as greatly to hamper progress. For interurban lines and long city lines alternating-current transmission was a necessity. However direct current was practically the only kind available in the early days for use in the motors so that the connecting link, the rotary converter and therefore the rotary converter substation, had to be developed. This institution was accepted as a necessary evil, although from the operating standpoint it was a success practically from the start. It involved extra investment in equipment and expense for operating labor. Hence the number of substation units was limited by the cost. A balance had to be struck between savings produced and cost to produce them.

The necessity for using rotary substations was a prime cause of the interest in the alternating-current motor for cars. The difficulties that had to be overcome in producing a satisfactory motor for this purpose were very great but they were overcome and a number of roads adopted these motors. Here again was the balancing of costs, that of the rotary converter substation against the higher cost of rolling stock. In general the rotary "won out." But while all of this progress was going on labor and equipment costs were mounting. The economic limit set to the number of substations possible on many lines was too low. At this point the automatic control came in to permit the number of stations to be increased without increase in labor cost. Here again the economic balance is being redetermined—with the labor factor largely eliminated.

In last week's issue of this paper a list of practically all of the automatic substations installed or ordered to date was given. By means of this it is possible to trace the story from 1915 to date, the short period covered by the actual operation of railway substations of this type. A considerable number of equipments are still to be delivered, so that it will be possible to keep track of progress for some time to come with the aid of the table. The Des Moines City Railway and the Inter-Urban Railway of the same city are the largest users of this type of substation to date. Next comes the Chicago, North Shore & Milwaukee Railroad, the equipment of which form the basis of an article by Charles H. Jones in this week's issue of this paper. Mr. Jones shows in a very convincing way just how and why the automatic control fits in with the equipment of this very important heavy interurban line.

Putting "Square Pegs" in Square Holes, i.e., Selecting Employees Scientifically

EMPLOYERS of labor have not harassed their gray matter very much during the last couple of years about the best manner of selecting employees. The obtaining of help of any kind has been a prime cause for worry, and the finding of a man best fitted for a certain kind of work has not usually been within the realm of practical possibilities. The signing of the armistice has wrought some kaleidoscopic changes, however. War industry workers are scurrying to the cover of more stable if less profitable employment, and peace renders our vast army of fighters a potential host of employment seekers. Because of the inherent stability and attractiveness of the work it seems likely that public utility service will attract many of those who are now or soon will be seeking employment. From the standpoints both of efficiency of work performed and of loyalty to employees the question, "How shall I select my employees?" is a vital one to railway executives today.

In the two or three years preceding the era of labor scarcity from which we are just emerging, considerable progress had been made in the methods of hiring employees by a number of companies. The old haphazard methods were being replaced by those which brought out to some extent the pertinent fact of whether the man was suited for the work in hand. Fitting the man to the job, or the job to the man as the case may be, getting the "square pegs" out of the round holes and into the ones in which they do fit, is scientific selection of labor and yields worth-while results to both employer and employee. The war has given an extraordinary impetus to the development of special tests and methods of determining a man's ability to achieve results along a given line. This is the work of trained practical psychologists, and since our entry into the war the government has had many such experts developing tests and methods of selecting men suited to the innumerable jobs that exist within the confines of a modern military organization. Over one-third of the enlisted personnel of the army has been given these tests. They have been used as the basis of selection of men for positions ranging from field officers to cooks and from air pilots to sappers.

Obviously no one universal test can be employed. A given employment requires a test which will bring out the prospective employee's ability to achieve results in that particular employment. At first glance many of the tests used seem foolish, but one is prone to change his opinions about the matter after taking one of them himself even if it is only one of those devised for the most ignorant and illiterate of the various classes of recruits who so recently were pouring into our cantonments. Of course such tests should be wisely employed and their results should not be regarded as all conclusive. They should not be seized upon as the grand panacea for all the ills that beset the employment office. The results of the War Department's experience have not yet found their way into print, but the growing use of the tests gives some indication of the regard in which they are held and points to their probable value to all employers of labor. At any rate they should be of assistance on electric railways in sifting out worthless applicants for positions.

Automatic Substations on the North Shore Line

Three New Substations in Operation and a Fourth Under Construction Save 177 Miles of 500,000-Circ.Mil Cable Worth $650,000

BY CHARLES H. JONES
Acting Electrical Engineer, Chicago, North Shore & Milwaukee Railroad, Highwood, Ill.

THE Chicago, North Shore & Milwaukee Railroad is a high-speed interurban line running between Milwaukee, Wis., and Evanston, Ill., a suburb of Chicago, where it connects with the Northwestern Elevated Railroad, one of the elevated lines entering the city. The interurban road is double track throughout practically its entire length, and among the places of interest located along the line are the largest naval training station in the United States, situated at Great Lakes, Ill., and an army post at Fort Sheridan, Ill. An outline map of the road is given in Fig. 1.

The rolling stock consists of 106 passenger cars, of which thirty are 45-ton steel interurban cars equipped with four 140-hp. motors each, and forty are 38-ton wood interurban cars equipped with four 75-hp. motors each. There are also ten express cars, four locomotives and 150 freight cars, together with the usual complement of line cars, work cars, plows, sweepers, etc.

An hourly high-speed limited service is given between Evanston and Milwaukee, a distance of 73 miles, and half-hourly service on Saturday afternoon, Sunday and holidays. The schedule speed throughout the run is 37 m.p.h. For 21 miles on the southern end of the system the line runs through towns requiring many stops and slow-downs so that on the balance of the run it is necessary to maintain a speed of 60 m.p.h. for a large part of the distance. For this service steel trains of two, three and four cars are used. A half-hourly express service is maintained between Evanston and Waukegan, a half-hourly local service between the same points and a two-hourly local service between Evanston and Milwaukee. On Saturday, Sunday and holidays, and on Wednesday, which has been visitors' day at the Naval Training Station when a public review has been held with an attendance as large as 30,000, service has been added between Evanston and the Naval Training Station so that an average interval of seven minutes for three-car trains has been maintained. In order to accomplish this it was necessary to rent considerable equipment.

In addition to the above passenger service an extensive merchandise dispatch service is maintained on the entire line, and over a portion of the line a great deal of carload freight is handled. This consists mostly of coal, gravel and crushed stone.

As an indication of the rate at which traffic has increased during the past few years, the car-miles run per annum are given as follows: 1915, 2,833,221; 1916, 3,292,559; 1917, 4,742,293; 1918, 6,023,582.

Power is purchased from the Public Service Company of Northern Illinois at Waukegan or Evanston, as the supply company sees fit, and from the Milwaukee Electric Railway & Light Company at Milwaukee. The current is furnished at 25 cycles, 13,200 volts, and is

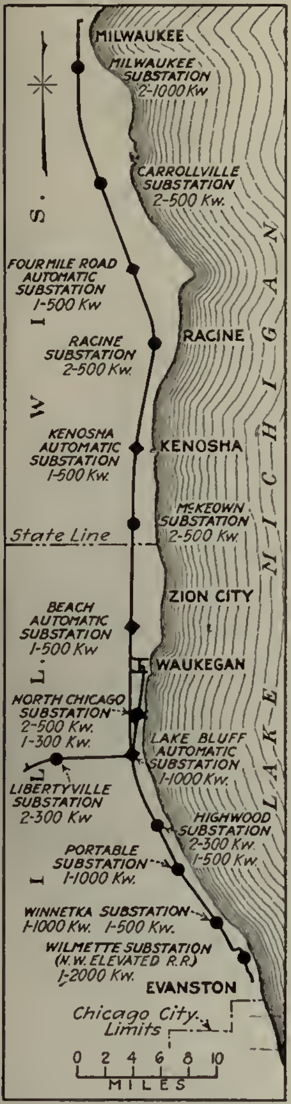

MILWAUKEE
MILWAUKEE SUBSTATION 2-1000 Kw
CARROLLVILLE SUBSTATION 2-500 Kw.
FOUR MILE ROAD AUTOMATIC SUBSTATION 1-500 Kw
RACINE SUBSTATION 2-500 Kw.
RACINE
KENOSHA AUTOMATIC SUBSTATION 1-500 Kw.
KENOSHA
McKEOWN SUBSTATION 2-500 Kw.
State Line
ZION CITY
BEACH AUTOMATIC SUBSTATION 1-500 Kw
WAUKEGAN
NORTH CHICAGO SUBSTATION 2-500 Kw. 1-300 Kw.
LAKE BLUFF AUTOMATIC SUBSTATION 1-1000 Kw.
LIBERTYVILLE SUBSTATION 2-300 Kw
HIGHWOOD SUBSTATION 2-300 Kw. 1-500 Kw.
PORTABLE SUBSTATION 1-1000 Kw.
WINNETKA SUBSTATION 1-1000 Kw. 1-500 Kw.
WILMETTE SUBSTATION (N.W. ELEVATED R.R.) 1-2000 Kw.
EVANSTON
Chicago City Limits
W I S.
I L L.
L A K E M I C H I G A N
0 2 4 6 8 10
MILES

FIG. 1—OUTLINE MAP OF C., N. S. & M. R. R.

distributed over the transmission lines of the railway company to the various substations on the line, the transmission voltage between Evanston and North Chicago being 13,200 and that between North Chicago and Milwaukee, 33,000. Step-up transformers are provided at the North Chicago and the Milwaukee substations, there being 3000 kw. of transformer capacity at Milwaukee and 1500 kw. at North Chicago. The power system as originally laid out consisted of substations at Milwaukee, Carrollville, Racine, McKeown Road, North Chicago, Highwood, Winnetka and Libertyville. From time to time, as the service was increased, feeder cable was added until the feeder system had reached the extent indicated in Fig. 2. With the addition of steel cars to the rolling stock in 1916 and 1917, the power system became inadequate. This condition was greatly exaggerated when the United States entered the war, at which time extensive plans were made to enlarge the Naval Training Station and the army post, both of these projects causing a great increase in travel along the line. A very close study of various methods available for enlarging the power system, among those considered being the addition of feeder copper, the changing of the trolley voltage from 600 volts to 1200 and the addition of new substations.

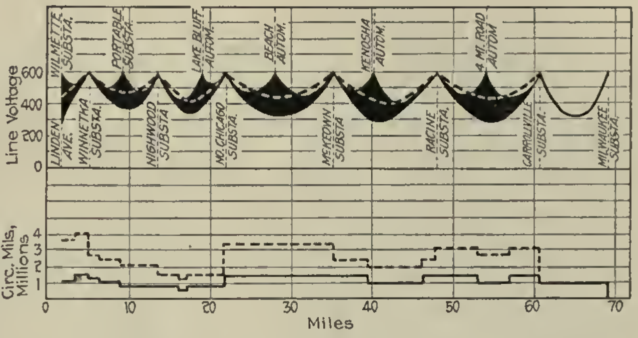
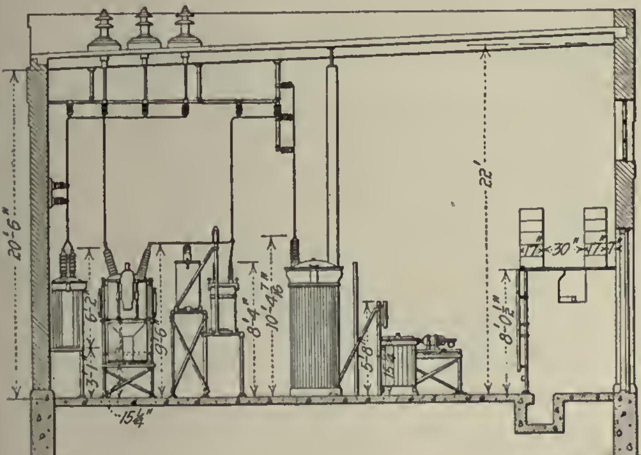


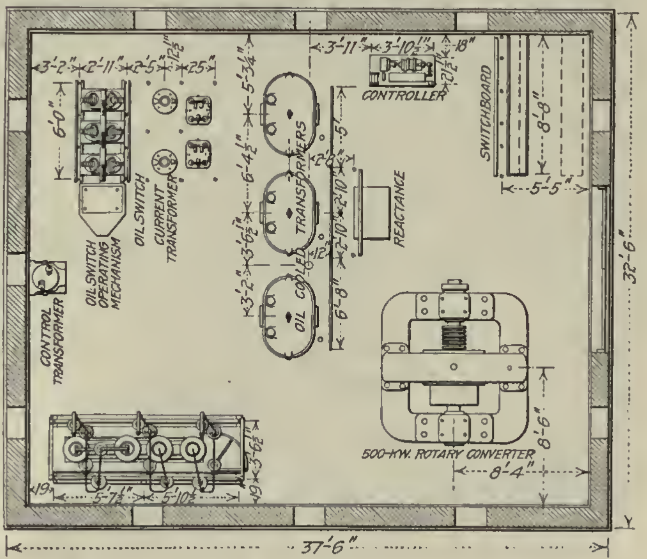
FIG. 2—ABOVE, CHART OF CALCULATED VOLTAGE ALONG LINE WITH 1500-AMP. CONCENTRATED LOAD; BELOW, POSITIVE FEEDER CAPACITY DIAGRAM

In upper figure, bottom border of shaded area shows voltage before new substations were added. Average voltage Linden Avenue to Carrollville, 421. Top border shows voltage with new substations added. Average voltage Linden Avenue to Carrollville, 510. Dotted line shows voltage with enough cable added to produce the lowest voltage obtained between substations in the various zones. Average voltage Linden Avenue to Carrollville, 498.

In lower figure, solid line shows amount of copper in positive circuit at present. Dotted line shows amount of copper required in the positive circuit to give line voltage shown dotted in the voltage chart above. Additional copper amounts to 177 miles of 500,000-circ.mil cable. Negative circuit consists of four 65-lb. rails Linden Avenue to North Chicago Junction; four 80-lb. rails North Chicago Junction to Carrollville, and four 80-lb. rails Carrollville to Milwaukee except for 3½ miles of single track.

A graphic representation of the results which would have been obtained by adding feeder copper or by adding new substations is shown in Fig. 2. The calculations were based on the assumption of a concentrated load of 1500 amp. traveling through the section. The resultant voltage which would be obtained at every mile point on the line was calculated and the drop to that point was plotted. It is evident from this drawing that an average of 421 volts existed throughout the system before the substations were added. With the substations put in as shown the average voltage was raised to 510. In order to determine what amount of copper would have to be added to the present system in order to produce the same low voltage point between substations as would exist under the new substation plan, the drop to the center point was assumed and the calculations were worked backward. The voltage drop at each mile point was then refigured and the resultant graph was drawn. This gave an average voltage throughout





FIGS. 3 AND 4—ELEVATION AND FLOOR PLAN OF SUBSTATION

the system of 498, and approximately 177 miles of 500,000-circ.mil cable would have been necessary. As this would cost approximately $650,000, while it was estimated that the additional substations could probably be installed for $150,000, assuming that new equipment was used in each of these added stations, it is quite apparent that the power system could not be built up economically by adding feeder copper. There were many complications to be considered in a proposed change in trolley voltage, due to the fact that in many places the line was operated through towns where it was not considered safe to use the higher voltage on the trolley. Therefore the control equipment would have had to be provided to take care of two line voltages. Furthermore, there were a great many old-type 600-volt motors in use which would have had to be discarded if the trolley voltage was

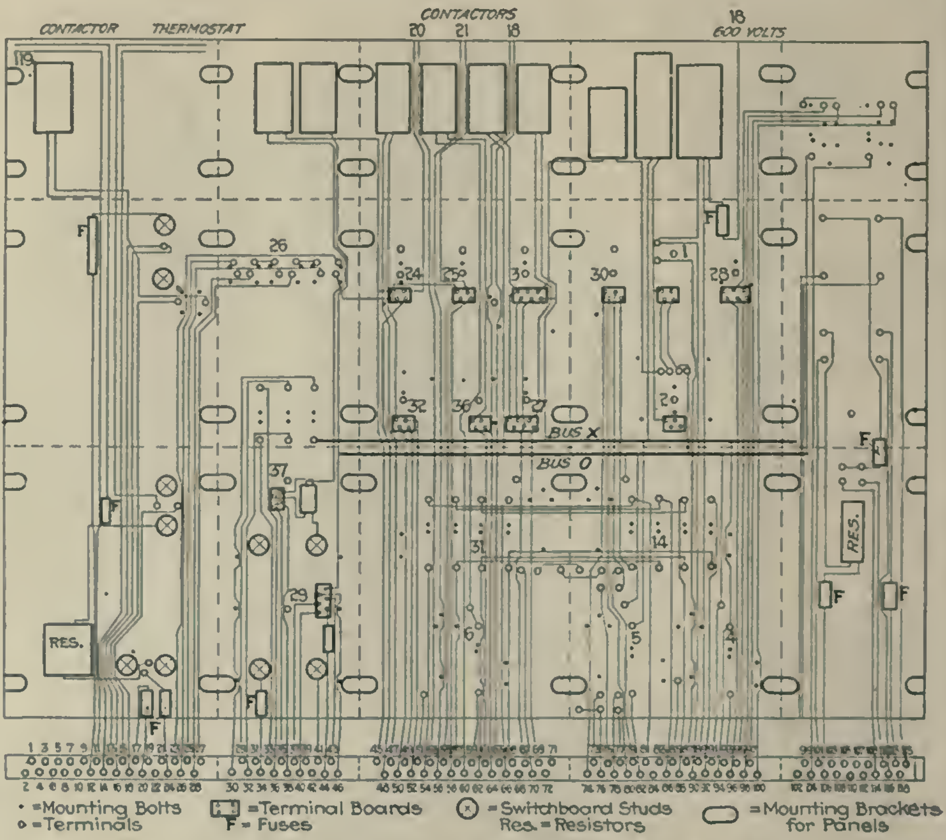


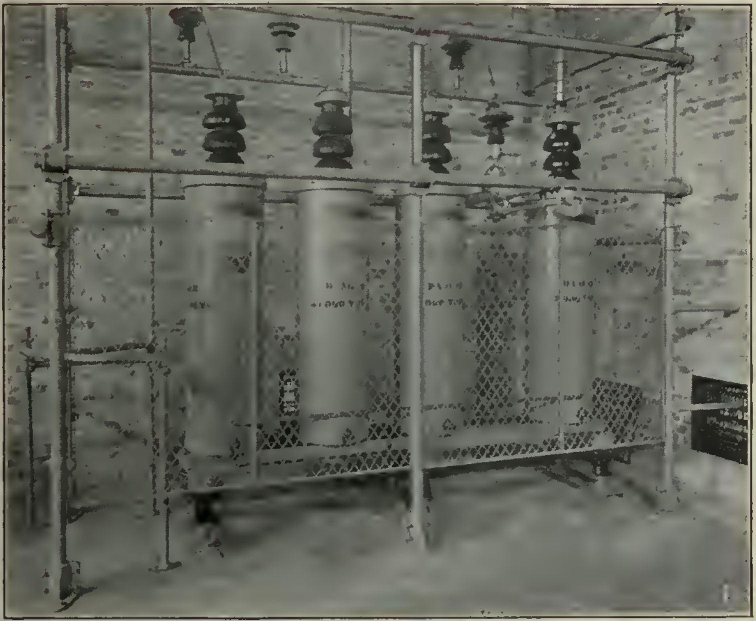
FIG. 5. WIRING LAYOUT ON BACK OF SWITCHBOARD
(See table for details)

TERMINAL BOARD DETAILS

No.	To Switchboard	To Apparatus	To Apparatus
7		Over speed limit	Ground
8		Series field shunt coil.	No. 17 controller
9		Under speed limit device	No. 20 controller
10		North bearing thermostat	South bearing thermostat
11	Resistance grid thermostat.	North bearing thermostat	
12	Positive bus	No. 111	
13	Circuit breaker interlock	No. 26	
14	Resistance grid thermostat	No. 69	
15	No voltage release—C.B.	Over speed limit No. 12	
16	Circuit breaker interlock	No. 85	
17	Fuse and No. 20	No. 30	
18	Contacts series relay No. 23.	Ground	
20	Fuse and No. 17	One-third tap on contactor No. 10	
23	Contact on relay No. 26	No. 67	
24	D.C. wattmeter	Ground	
25	All coils on relay No. 26	Each low tension current transformer	Three wires—ground
26	Contact on relay No. 26	No. 13	
27	Coil on relay No. 26	No. 116	
28	Coil on relay No. 26	No. 58	
29	3-pole switch bus O No. 2	Control transformer	
30	3-pole switch bus X No. 1.	Control transformer	
32	Three-pole switch No. 2	No 104	
33	Three-pole switch No. 3	No. 47	
34	Rev. current relay No. 29	Controller No. 7	
35	Underload relay No. 37	No. 89	
36	Three-pole switch No. 3	No. 106	
37	Underload relay No. 37	Auxiliary contact, oil switch	
38	Underload relay No. 37	No. 90	
40	Reverse current relay No. 29	No. 77	
41	Machine positive	No. 60 and No. 114(2)	Rheostat No. 1
43	Rev. current relay No. 29	Exciter negative	Controller 21 (1 wire)
44	Underload relay No 37	No. 64	
45	Relay No 24	Ground	
46	Reverse current relay No. 29	No 54	
47	Resistance for relay No. 24.	No. 33	
48	Relay No. 24	North low-tension current transformer	
49	Relay No. 32	Controller No. 2	
50	Relay No. 32	No. 17	
51	Contactor No. 6	Controller Nos. 16, 17, 18	
52	Relay No. 32	Top contact No. 16 interlock	
53	Contactor No. 6	Controller No. 10	
54	Ex. field contactor No. 31	No. 46	
55	Relay No. 25	South low tension current transformer	
56	Contactor No. 20	Controller No. 11	
57	Shunt field bus	Rotary shunt field	
58	Relay No. 25	No. 28	
59	Contactor No. 6	Controller motor	
60	Resistance for relay No. 36	No 41	
61	Relay No. 36	Ground	
62	Shunt field bus	Rotary shunt field	
63	Contactor No. 18	Lower contact No. 16 interlock	
64	Relay No. 36	No. 44 and controller No. 8	
65	Shunt field bus	Rotary shunt field	
66	Exciter field bus	Exciter pos., controller No. 22	
67	Relay No. 27	No. 23	
69	Relay No. 27	No. 14	
70	Top contact 31 interlock	Controller No. 4	
71		Controller No. 5	Interlock No. 10
73	Top contact No. 5 interlock	Controller No. 23	No. 94
74	Relay No 30	Ground	
75	B't'm contact 14 interlock	Ground	
76	B't'm contact 5 interlock	Controller No. 15	
77	B't'm contact 5 interlock	No 40	
78	Top contact No. 5 interlock	Controller No. 19	
79	Top contact No. 14 interlock	Controller No. 3	
80	Relay No. 30	Bottom contact No. 16 interlock	
81	Exciter field bus	Rotary shunt field No. 4	
82	Contactor No. 5	Controller No. 1	Oil sw. closing coil 1
83	Coil of contactor No. 4	No. 16	
86	Exciter field bus	Rotary field No. 3	
87	Voltmeter No. 1	Ground	
88	Exciter field bus	Rotary field No. 2	
89	Resist. for voltmeter No. 1.	No. 35	
90	Voltmeter No. 1	No. 38	
91	Coil of contactor No. 4	South bearing thermostat	Oil switch No. 4
92	Exciter field bus	Field rheostat No. 2	
93	Contactor No. 4	Controller No. 13	
94	Contactor No. 4, bus X	No. 73, controller 23.	Controller motor, O. S. No. 3
95	Relay No. 28	South high tension current transformer	
96	Relay No. 28	North high tension current transformer	
97	A. C. bus circuit breaker	No. 1 trip coil oil switch E	
98	Relay No. 28	Oil switch trip coil, high tension current transformer	Ground
99		Oil switch opening coil	Controller No. 24
100	A.C. bus circuit breaker	Oil switch trip coil No. 1	
101	Reactive volt ampere ind.		
104	A.C. bus circuit breaker.	No. 32	
106	Reactive volt ampere ind.	No. 36	No. 1 lead power transformer
111	Voltmeter receptacle	No. 12	
113	Reactive volt ampere ind.	No. 3 lead power transformer	
114	Voltmeter receptacle.	No. 41	
115	D.C. voltmeter	Ground	
116	Reactive volt ampere ind.	No. 27	
118		O.S. auxiliary contact	Controller 14 underspeed device 13

changed. Therefore, the only plan that appeared feasible was to add new substations, and this was adopted. A careful study was next made of installations of automatically-operated substations, with the result that two equipments were ordered. The rotary converters for use in these two stations were obtained by installing a 1000-kw. rotary in Winnetka substation, thereby releasing two 500-kw. machines. Two more equipments have since been installed and a fifth is on order. Some details of the construction follow.

The substation buildings are one story in height without basement, and have shallow machine pits, the floor being raised about 2 ft. above the surrounding ground level to prevent water accumulations in the pit. The foundations are of concrete and extend to a point about 6 in. above the floor level, the walls from this level up being built of brick. Pressed brick is used on the outside and common brick on the inside. The roof, which is of 3-in. reinforced concrete, is supported by heavy steel beams, one steel column being located approximately in the center of the building. The floor is of concrete, 6 in. thick, laid on a cinder foundation. Light is admitted through wire-glass windows set in steel frames just below the ceiling level on three sides, and a pair of double doors are located on the track side of the building for use in bringing in the equipment. In one of these doors is set a small door for general use. Ventilation is provided by louvers on all sides just above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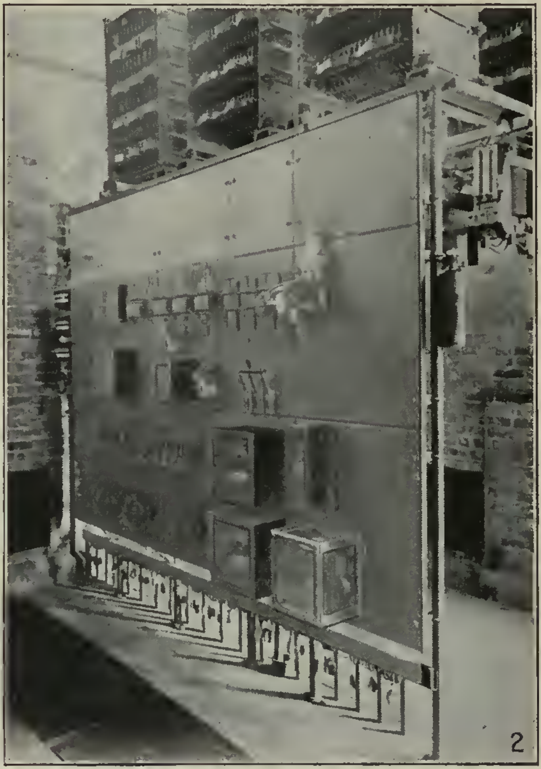
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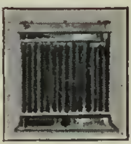

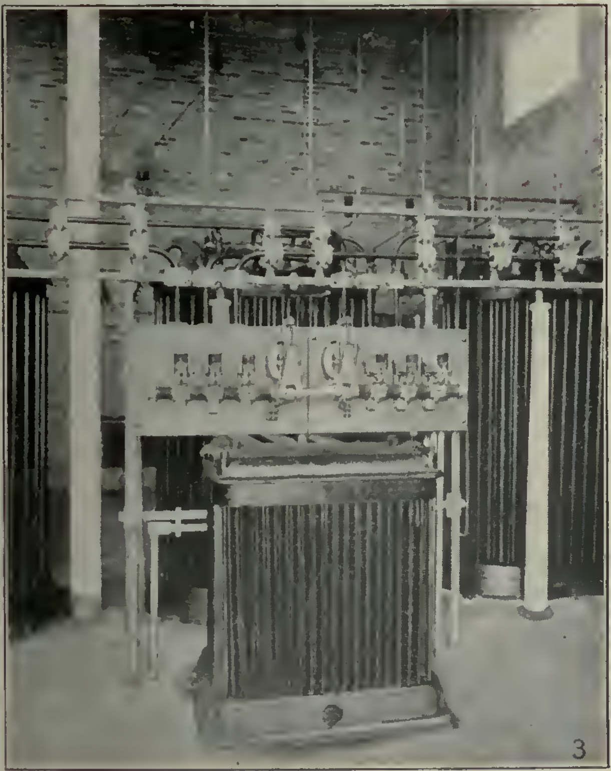
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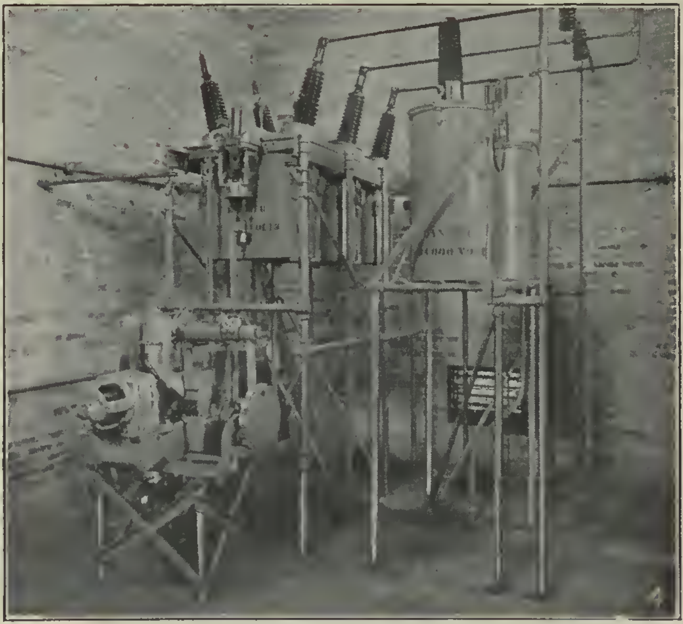
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APPARATUS IN A CHICAGO, NORTH SHORE & MILWAUKEE AUTOMATIC SUBSTATION
No. 1—Lightning arresters. No. 2—Switchboard with resistors above. No. 3—Transformers and resistance coils. No. 4—Oil switch with operating mechanism, and current transformers.

the floor level and Burt ventilators in the roof. Two ventilators are used in the 500-kw. stations and three in the 1000-kw. stations. The high-tension line entrance is made through the roof, with 45,000-volt entrance bushings. Figs. 3 and 4 show an elevation and floor plan of the stations giving the general arrangement of the equipment, while the head piece of this article furnishes a good idea of the external appearance of a typical station.

All high-tension work is made of $\frac{3}{8}$-in. copper tubing mounted on pipe racks suspended from the ceiling. Oil switch, control transformer, current transformers and potential transformers are elevated above the floor on pipe racks, the lowest point to which high-tension bus or exposed connections are brought being 9 ft. 6 in. above the floor, so that it is impossible for anyone to come in contact with them without deliberately planning to do so. The arrangement of all apparatus is such that it is not necessary to reach across any "high tension" to work upon disconnecting switches or fuses. A 33,000-volt outdoor-type lightning arrester is installed within the building, wire guards being placed on the front of it to prevent anyone from accidentally coming in contact with the tanks.

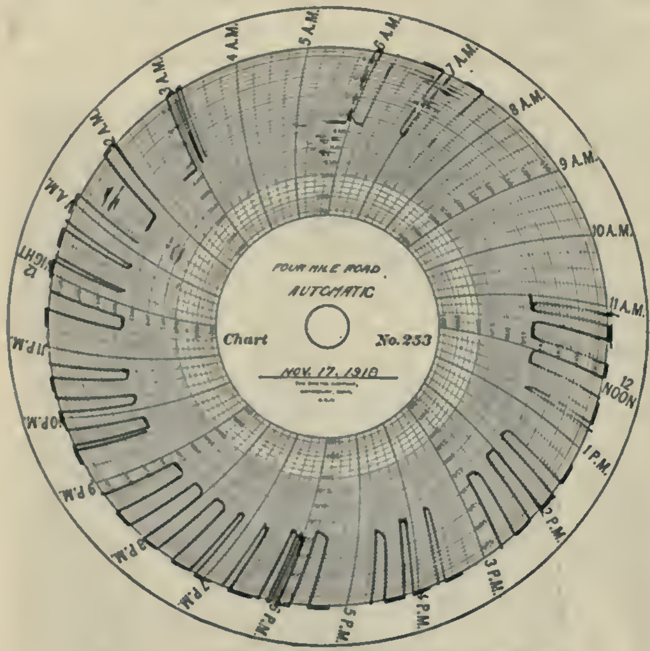


FIG. 6—SAMPLE SUBSTATION VOLTMETER RECORD CHART

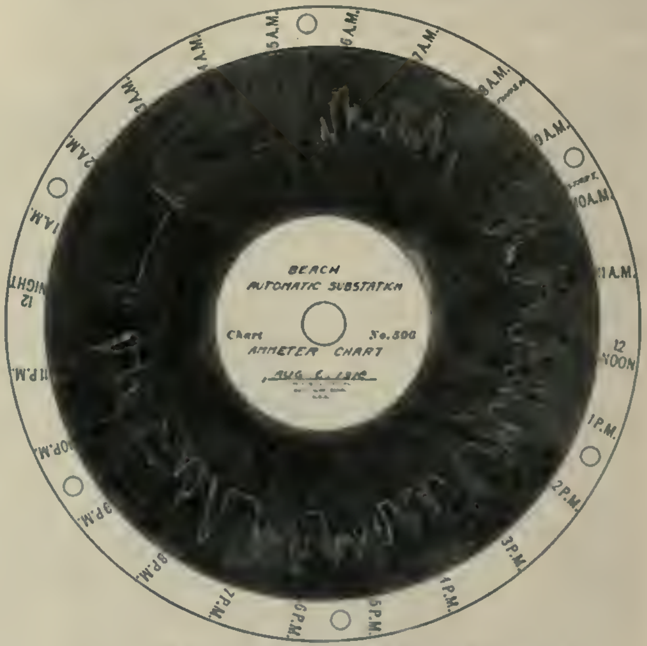


FIG. 7—RECORD, ON SMOKED PAPER, FROM RECORDING AMMETER

The oil-switch operating mechanism is mounted on a pipe rack about 2 ft. above the floor and a direct connection is made between the operating mechanism and the shaft, instead of the usual connection on the side. This makes possible a better arrangement between the switch and the mechanism.

Low-tension connections between the transformer and the alternating current side of the rotary are made with rubber-insulated, lead-covered copper cable mounted on a pipe framework set up in front of the transformers. The starting and running contactors are mounted in front of the middle transformer and directly over the external reactance. An air duct is provided from one of the intake ventilators to the rotary converter pit to furnish cool air to the rotary during hot weather.

All control wiring is installed in iron conduit buried in the concrete floor, and the switchboard is mounted in one corner of the building about 6 ft. from the wall. Ample working space is thus provided behind the board. A trench is located in the floor at the rear of the switchboard and in this all control conduits terminate, short pieces of conduit extending through the floor into this trench from the terminal strip located at the bottom of the switchboard. The trench is provided with a slate cover.

The controller is mounted on an angle-iron table about 2½ ft. above the floor, thereby providing easy access to it. Wires from the controller are carried in a 3-in. iron conduit which extends from the wire trench to one leg of the table, then up the leg and along underneath the controller with three 1½-in. short nipples welded in the horizontal run so as to bring the wires out at their proper place.

The current-limiting resistors are mounted on channel iron racks supported at one end by the building wall and resting on the switchboard stanchions at the other end, with the shunting contactors suspended from the bottom of the resistance grid supports. These supporting irons are mounted at such a height as to give at least 6 ft. clearance from the bottom of the contactor to the floor level. All connections between resistance boxes, contactors and circuit-breaker studs on the board are made with bar copper.

SWITCHBOARD WIRING GREATLY SIMPLIFIED

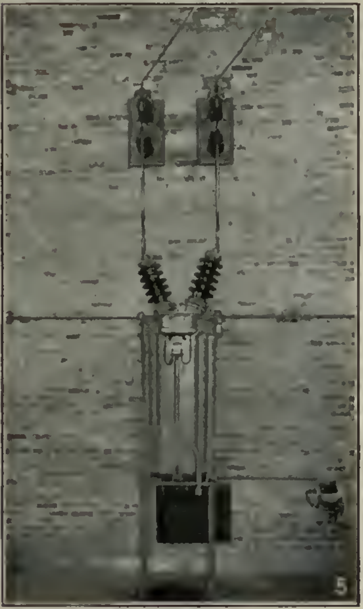
The switchboards themselves were wired on the job. Additional panels were provided above the regular instrument and equipment panels and on the back of these all instrument and apparatus resistors were mounted. At the bottom of the board is a slate strip on which terminals are provided, all control wiring being run direct from the apparatus through the conduit in the floor to these terminal strips, and all connections from the instruments and apparatus on the panels being run down to this same terminal strip. This arrangement, and the mounting of the resistors at the top of the board, make it possible to install very straight and direct switchboard wiring, eliminating practically all wiring crosses on the back of the board. Fig. 5 (page 85) shows the wiring layout on the back of the board, together with the terminal strip, and the table accompanying the drawing shows where each of the wires leads from the terminal post.

A system of ground cables was laid in the concrete floor. This was connected to a ground cone and the track rail, and all pieces of apparatus were connected to this system. All grounding connections were made by welding with an acetylene torch. All through the station a great deal of work was done with these welding and cutting torches, as in making up the control transformer and controller stands and many special pipe fittings.

The buildings are of sufficient size to accommodate a machine of larger capacity, and if it should ever become necessary to provide a two-machine station, the extension for the second machine would be made at the side toward the controller so that the switchboards would join.

Each of these stations is tapped off from the high-tension line. Therefore, in order to make each one as flexible as possible, pole disconnecting switches are provided on both sides of each station so that it is possible to work on the high-tension line on either side of the station and still keep the station running. On the last station built, two steel towers were used in place of the wooden poles, with very pleasing results, the operating rod for the switch being extended down inside the station walls.

For the purpose of checking operation considerable experimental work has been done in order to obtain a record from which some information will be available daily as to determine what is occurring in the stations. A summary of some of the plans tried follows, and, while no one of them gives all the information desired, each has some merits. Further experiments are being conducted along these lines.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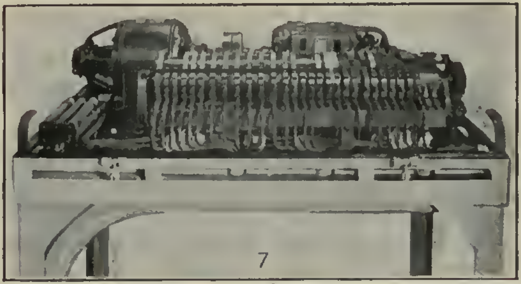
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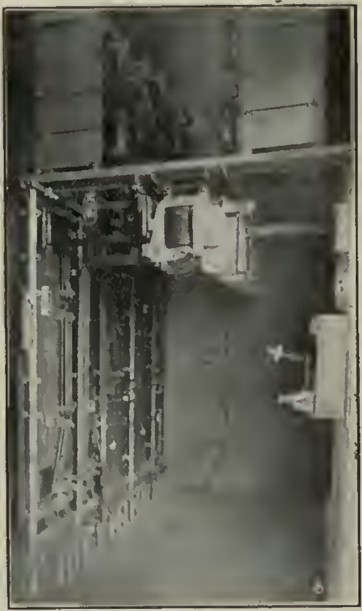
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DETAILS OF THE SUBSTATION EQUIPMENT, SUPPLEMENTING THOSE SHOWN ON PAGE 87
No. 5—Control Transformer. No. 6—High-tension Connections on Roof. No. 7—Main Controller.
No. 8—View Behind Switchboard, Resistors above with Shunting Contactors Beneath Them

First a recording voltmeter, with stops arranged to limit the range of motion of the pen, is used to indicate when the station is running and when it is shut down. This gives a record of the length of time the station is running, indicates false starts and also serves to indicate failures of any pieces of the apparatus. A sample chart is shown in Fig. 6.

Second, a recording ammeter is used to give a record similar to that obtained with the voltmeter. It also shows the load which the station carries while it is on the line and gives more information about equipment failures than the voltmeter. A sample chart from this instrument is given in Fig. 7.

Third, as a further check on operation, mechanical counters are being installed on the following apparatus: Controller, main contactor, shunting contactor, thermostats and no-voltage relays. By means of these it is possible to determine the number of times these pieces of apparatus operate. By following the registration of these counters from day to day, any failures of apparatus can be observed. A daily inspection of stations is made at which time the charts are changed, counters and meters are read, apparatus is inspected and cleaning done. This, however, is not sufficient and a record of what takes place when nobody is in the station is very desirable.

The first of these stations was put into service as an "automatic" in December, 1917, and went through the following severe winter with very gratifying results. This station carries an extremely steady load and runs continuously about eighteen hours per day. The second station was put into service in the early part of April, 1918. It operates practically 50 per cent of the time during eighteen hours of the day. The third station was put into service in the early part of November, 1918, and runs about 50 per cent of the time, but it does considerable more starting and stopping than either of the other two stations. The fourth station is now under construction and will be put into service during the early winter. This is a 1000-kw. station. It will carry a heavy load for about twenty hours per day with very little starting up and shutting down.

The construction work on these stations was carried out by Caesor Antonio, construction foreman, under the supervision of the writer.

Rehabilitating the Disabled French Soldier

The Author Tells How Steps Are Being Taken to Utilize Disabled Soldiers in the Electric Railway and Other Industries

By LUCIEN A. H. PAHIN
Pontoise, France

THE French law of April 17, 1916, provided under special conditions for the employment of soldiers and sailors invalided home, or retired on account of infirmities resulting from wounds received or diseases contracted at the front in the course of actual warfare. One article of this law provides that certain public departments, as well as industrial or commercial enterprises which enjoy concessions, monopolies, or state, departmental or communal subsidies, must furnish lists of occupations and indicate the conditions under which employment may be secured by returned soldiers and sailors, and must give their order of preference in these lists. They must also include the proportion of such openings with respect to their total staffs which have not been "reserved" in accordance with previous military laws.

In applying the provisions of the above law four electric railways in and about Paris have established lists of the occupations which will be available for the disabled soldiers and sailors, and the President of the Republic has approved the plan of the companies by a decree under date of May 13, 1918. The railways referred to are the one connecting Paris and Arpajon, the north-south subway line in Paris, the Bois de Boulogne railway and the tramway line on the left bank of the Seine in Paris.

Each list indicates in regard to each employee the following: (1) The category into which each occupation falls in accordance with a classification under four heads established by a law of Aug. 26, 1905. (2) For the various parts of the body, those which when affected by wounds will not necessarily interfere with employment in the occupation in question. (3) The conditions which the applicants must fulfill in order to be employed in the several lines of work. (4) The ratio of the number of disabled soldiers and sailors to the total which the employer considers preferable. (5) The probable annual number of vacancies for disabled men. (6) The wages or salaries to be paid, and the rights of the employees with respect to pensions.

It is understood that former employees who have been injured but are available for re-employment will be reinstated without delay by their former employers either in the lines of work previously occupied or in different work.

To illustrate the kind of report which is prepared the accompanying list from the Arpajon railway is reproduced. Those of the other railways are similar in general, varying only in accordance with local conditions.

TABLE OF OCCUPATIONS FOR DISABLED SOLDIERS AND SAILORS

Classification Number	Occupations	Parts of Body Which May Be Wounded Without Disqualifying the Worker	Special Conditions of Employment, Examinations, Etc.	Proportion of Rehabilitated Men Desirable	Probable Number of Annual Vacancies	Wages or Salary—Right to Pension
2	Accountants, draftsmen......	Skull, face, eyes, ears, neck, chest, genital organs, back, pelvis, thigh, leg, foot......	Written and oral examinations...	50 per cent	Rare	5 fr. per day
3	Copyists, clerks, warehousemen, storekeepers, etc......	Skull, face, eyes, ears, neck, chest, genital organs, back, pelvis, thigh, leg, foot......	Written and oral examinations...	50 per cent	Rare	5 fr. per day
3	Inspectors..................	Skull, chest, genital organs, arms, thigh, leg, foot.........	Written and oral examinations...	15 per cent	Rare	5.5 fr.
4	Conductors.................	Same except omit skull	Must be able to read, write and calculate....................	15 per cent	Rare	5 fr.
4	Doorkeepers, night watchmen	Skull, face, chest, genital organs, thigh, leg, foot	Written and oral examinations...	10 per cent	2	5 fr.
4	General workmen...........	Skull, face, chest, genital organs, thigh, leg, foot	Must be able to read, write and calculate....................	10 per cent	2	5 fr.
4	Locomotive drivers.	Face, genital organs...	Same plus professional knowledge	15 per cent	Rare	5.5 fr.
4	Chauffeurs..................	Face, genital organs...	Same plus professional knowledge	15 per cent	Rare	5.5 fr.
4	Motormen.	Face, chest, genital organs, thigh, leg, foot.... ..	Same plus professional knowledge	15 per cent	Rare	5 5 fr.
4	Mechanics.................	Skull, face, eyes, neck, chest, abdomen, genital organs.........	Same plus professional knowledge	10 per cent	1	0.45 to 0.70 fr. per hour

Of course in regard to all parts of the body there are certain tasks which impose restrictions not indicated in the table. For example, for the hands, arms and feet the infirmity can involve only a certain amount of functional disability. Again in most of the cases it is necessary that the employee be able to talk.

The Paris lines have been cited as examples, but similar provision has already been made or will ultimately be made in the case of many other railway lines. The tables which they have prepared do not differ essentially from those prepared earlier. The law of April 17, 1916, provided that in future no industrial or commercial enterprise may obtain a concession or monopoly, or state, departmental or communal subsidy, except on the condition of reserving for the military purposes mentioned a certain number of positions, and they will be expected particularly to consider the cases of fathers of large families.

Canadian Lines Near Breaking Point

Despite Higher Costs of Operation, Municipal Authorities Demand Old Fares and More Service—Municipally Owned Lines Are Losing Money—Service-at-Cost Plan, as Adopted in Massachusetts, Is Being Sought by Ontario Investors

BY ERNEST P. FREDERICKS
Publicity Director Association of Holders of Public Utility Securities, Toronto, Ont.

ELECTRIC railway history is repeating itself in Canada, where the cost of operation is more than it is in the United States and where most of the lines are getting less than a 5-cent fare. The inevitable has happened, and it is hardly surprising that practically every railway in the Dominion is in financial difficulties. This does not except those that are municipally owned.

For some time prior to the war there were evidences that the tramways of Canada were destined to suffer from the same conditions that have since become country-wide in their influence. Rising costs in every department of operation, scarcity of labor and a pronounced political antagonism have rendered the position of the tramways in Canada well-nigh intolerable. What aggravates the situation is that there is very little apparent inclination on the part of municipal authorities to meet the issue half-way.

In most cases the tramways have contracts in the respective cities running anywhere from twenty-five to thirty years. In a number of instances these contracts provide that when the agreement expires the city can take over the roads, as has already been done in a number of the smaller communities. To appreciate fully the trend of conditions, one must realize that Canada is the hotbed of municipal ownership. Yet, on the record of past performances, one is justified in wondering why this feeling is so intense or why municipalization is regarded as the panacea for all tramway ills. Certain it is that public ownership of tramways in Canada has anything but a clean slate.

MUNICIPAL OPERATION SHOWS DEFICITS

In Port Arthur and Fort William, the publicly-owned tramways are losing about $100,000 a year; this, too, despite the fact that fares are double what they were when the war started. The London & Port Stanley Railway, a municipal enterprise, through favorable action on one application has had an increase in fares allowed and is now asking for another.

The Toronto Civic Railway, which has been operated by the city for the last four years, will show a deficit this year of about $200,000. For the four years it will show an aggregate loss of $687,000.

In Saskatoon, St. Thomas and Edmonton the municipal tramways are working on the wrong side of the ledger and have been for some time.

The Brantford Municipal Railway was compelled to readjust its rates this summer in order to overcome a $12,000 deficit.

Calgary has been in a bad way and even after being bolstered up is barely breaking even on its municipal tramways. A year ago the Calgary Municipal Railway showed a deficit of more than $19,000; this year, up to the end of August, there was a surplus of a little more than $7000, but owing to a 4 per cent tax which was placed on the railway in June by the City Council this surplus will be eaten up.

The Regina Municipal Railway for the nine months ended Sept. 30 showed a deficit of more than $40,000, and it is believed that this will be increased to $50,000 by the first of the year.

All things considered, public ownership has not proved the ideal arrangement that its advocates would have us believe.

OBSTRUCTIONS OFFERED TO HIGHER FARES

In the few cases where increased fares have been allowed in Canada the companies have found it almost impossible to put the new schedules into effect because of injunctions and other court proceedings prompted from a variety of sources. The case of the British Columbia Electric Railway is a striking example of how some of the rate situations have been handled. In this case, the Vancouver City Council granted the company the right to charge a 6-cent fare. As a result of this decision the company began paying increased wages and thereby averted a strike. Some weeks later, after the order had been signed by the city clerk, the Mayor refused to sign it. Thereupon the City Council decided that it had overstepped its powers in granting the increase. The question was finally put up to the people for a vote, and, as in the case of other referendums on the same question, the increase was turned down by the people.

The company then issued a statement in which it said that there was no doubt that the City Council had authorized the increase and that the company would proceed forthwith to charge the 6-cent fare. The city applied for an injunction, but the court refused to issue one and the case has been thrown into the courts to be fought out at a later date. Such cases are not unique either in Canada or in the United States, but they stand out more clearly in the Dominion because rate increases are so seldom allowed.

Despite the inevitable consequence of trying to pay yesterday's liabilities with next week's assets, the railways are being held strictly to the fare schedules of twenty or more years ago. The result is that in a number of cities as many as nine rides for a quarter are being sold, and 25 cents for six rides is almost everywhere the maximum charge. The companies say they cannot continue under such rates, and the City Councils, which in most cases are the clearing houses for tramway troubles, are almost unanimous in declaring that the companies must not only continue at the old fares but must give additional service. It is evident, from this condition of affairs, that the breaking point is not far distant.

ONTARIO SECURITY HOLDERS ORGANIZE ASSOCIATION

As far as Ontario is concerned, the shareholders of the tramway companies have organized for the purpose of devising a plan of relief that will tide over the situation. The Association of Holders of Public Utility Securities, organized along much the same lines as the Massachusetts association a year ago, is conducting a campaign of education to let the riding public know just what the real conditions are and to urge the adoption of the service-at-cost plan of operation for the Ontario roads that need relief. The plan proposed will be formed along the lines of the general service-at-cost plan adopted for Massachusetts with such changes as may be necessitated by the local conditions.

Articles explaining the proposed form of relief are being sent to the leading papers of the Province, and literature giving more detailed explanation of the service-at-cost plan is being prepared for general distribution. Much publicity has already been secured, and the plan has been very favorably received outside of Toronto, where the City Council candidly admits that it wants, and expects, service at less than cost. Perhaps later on, if the city takes over the railway in 1921, the people may be willing to contribute several hundred thousand dollars a year out of the city treasury to make up the deficit resulting from a less-than-cost service.

In the meantime an effort is being made to put the electric railway business of Ontario on a business basis. Montreal has already done this through the service-at-cost plan; Winnipeg is about to launch such a plan, and Ottawa is looking into the merits of the zone system. The Ottawa Electric Railway franchise expires in 1923, and if the city does not acquire the property the franchise will automatically continue for a further period of five years. The company has been asked to make a number of extensions and improvements, but it is not felt that these large expenditures can be made in view of the uncertainty that confronts the company. As far as the zone system is concerned it is not generally indorsed in Canada because experience has shown that where traffic is heavy the fare collection problem is one that makes the zone system impractical.

SERVICE-AT-COST IDEA GAINING FAVOR

In Toronto the situation is about as acute as it is anywhere in the Dominion. On Oct. 9 the Toronto Railway, which is the privately owned railway in the city, petitioned the City Board of Control for its co-operation in obtaining a straight 5-cent fare. Without any investigation of the merits of the case the board decided unanimously to refuse to entertain the proposal. This refusal was subsequently supplemented by what many consider a continuous performance of persecution, and at the present time the city is trying to collect a fine of $24,000 and $1,000 a day imposed by the Board of Control because the company failed to increase the number of its cars as ordered by the board. Just what the outcome will be no one can prophesy, but in view of the present unfriendly attitude of the city government the company can hardly look for much co-operation from that source. In justice to the company it should be said that the service in Toronto is as good as, if not better than, that in most cities of the same size anywhere on the continent and much better than in a number of cities where fares are much higher.

In Hamilton the Radial Electric Railway secured permission to increase its rates last summer, but there was such unanimous opposition that the company decided to waive the proposed increase and announced instead that it would reduce the service. This also met with widespread opposition, and the company was ordered to maintain its regular schedule. Matters have been allowed to drift along from month to month without much sign of improvement, and the company has now announced that one of three things must be accomplished: (1) an increase of fares sufficient to meet expenses of operation; (2) the cessation of operation entirely and realization on the company's physical property at the present high prices of material, or (3) the adoption of the service-at-cost plan of operation. [Since this article was written the Hamilton Radial Electric Railway completely suspended service.—EDS.]

The situation in London is also rather interesting. For a little over a year the London Street Railway has been trying to get the City Council to approve a service-at-cost plan of operation, but thus far efforts have been unavailing. Nor can the company get any other form of relief. The inconsistency of this position is attested by the fact that the London & Port Stanley Railway, which is a municipally controlled road, made a plea for relief on exactly the same grounds as the London Street Railway did and the municipal line was at once authorized to make a sufficient advance in fares to cover the increased costs of operation and to provide a sufficient surplus for taking care of its capital obligations. It has never been clearly explained or understood why relief was granted in the case of the municipal line and denied the privately-owned company.

The opinion generally throughout the Province of Ontario is that it is only a question of time when the tramways, municipal as well as privately owned, will be on a service-at-cost basis. Sir Adam Beck, one of the most stalwart advocates of municipalization, in pleading for increased fares for the London & Port Stanley Railway, is credited with saying that "all the road wanted was enough to cover the cost of service." This is characteristic of the position that is being taken by everyone in the Dominion who has investigated tramway conditions and who realizes that the lines cannot continue to give adequate service if they are obliged to sell this service at less than its actual cost. When this self-evident fact becomes generally recognized, the tramways of Canada will be on the road to a solution of their problem, and the riding public will be more likely to secure the kind of service that manifestly cannot be given by companies constantly hovering on the verge of financial disaster.

In his annual report for the year ended March 31, 1918, C. J. Spencer, until recently manager of the Bradford Corporation Tramways, states that excellent results have been secured with a railless trolley battery vehicle which has been used to carry stores required for car repairs, sand, etc. The cost of operating the vehicle is less than that of gasoline lorries engaged in similar work.

Equipment Accessories Desirable in Electric Arc Welding*

Proper Protection for the Operator Is Essential and Conveniences Added Insure Better Workmanship

TO INSURE a high class of workmanship in arc welding and properly to protect the worker from injury, certain equipment accessories have come to be recognized as absolutely essential in carrying out electric welding.

Face shields are of great value. The practice is to provide two types for protecting the eyes and skin from the light rays of the arc when welding. One is a shield so constructed that when it is held in front of the face by one hand, the arc will be observed through a combination of colored glasses located in the center. The shield is of such size as to cover the entire face in order that the skin will not be blistered by the rays from the arc. Fig. 1 shows a sketch of such a shield designed to be held in the hand. This type has been found to be satisfactory. Such a shield is cooler than the helmet type and as a rule is preferred for "down-hand" welding, since ordinarily this class of welding does not require a free hand to steady the body. A face shield should always be made of material which is a non-conductor. Where a metal shield is used, holes will accidentally be burned in it, after which it is often used to the detriment of the operator's eyes. Also slight shocks are often felt when welding with a metal face shield in close places, especially when the face and hands are moist from perspiration. This tends to make an operator nervous and may result in a poor weld.

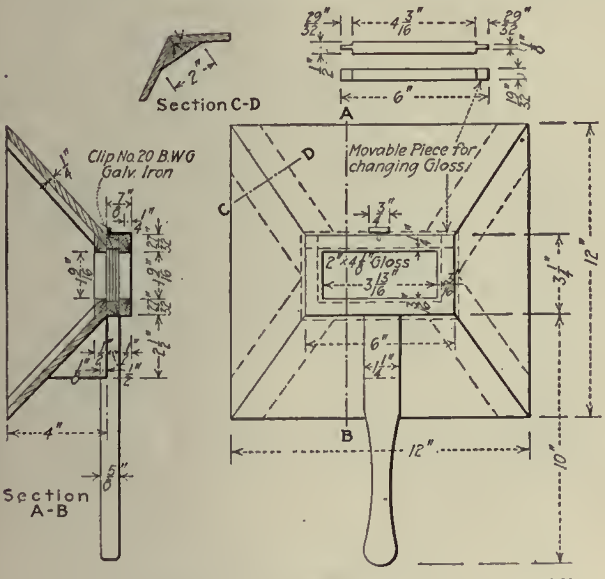

FIG. 1—WOODEN FACE SHIELD FOR HAND USE

For the more difficult operations, such as overhead welding, or welding which requires the operator to be in a standing position, a shield of the helmet type should be provided, in order that the operator may be able to use one hand to steady himself. Many different satisfactory designs of head helmets are on the market. Fig. 2 shows a face shield of the helmet type. A combination of glasses which has proved satisfactory is two red glasses, one green glass and one clear glass. The clear glass is used between the colored glasses and the work to protect the former from being pitted by the flying particles of hot metal. It is replaced when it becomes so badly pitted as to interfere with the vision. All glasses should be of single strength thickness.

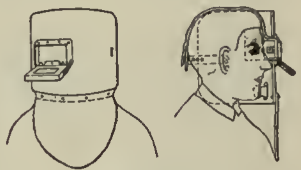

FIG. 2—HELMET TYPE OF FACE SHIELD

In practice it is found that the density of the coloring in the glasses does not run uniform, *i. e.*, one red glass may be very dark while another may be comparatively very light. The same holds true with green glasses. This variation can be used to advantage by operators as it permits them to select a set of glasses having coloring of such density as is best suited to their eyes. The requirements vary greatly among the differ-

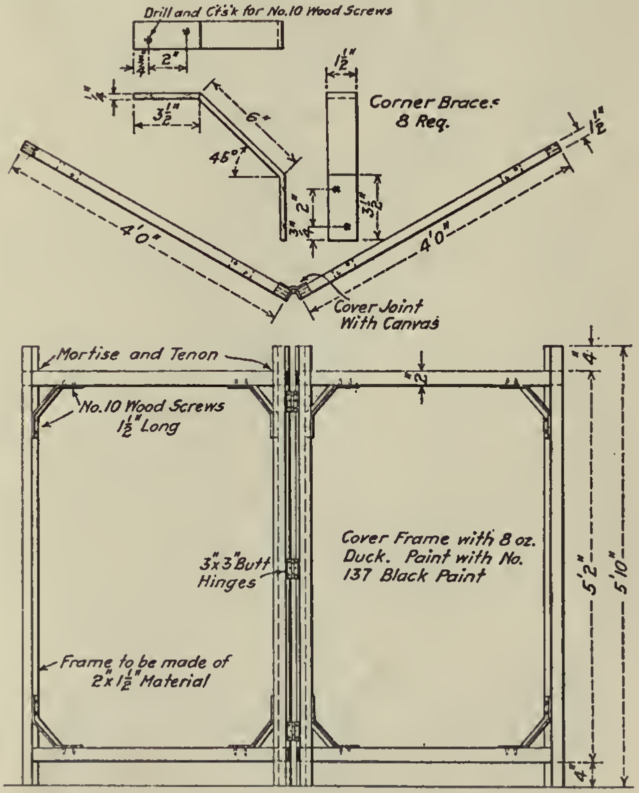
Drill and Cts'k for No. 10 Wood Screws
3/4"
2"
1 1/2"
3 1/2"
6"
45°
Corner Braces 8 Req.
2"
3 1/2"
3/4"
1 1/2"
4'0"
4'0"
Cover Joint With Canvas
Mortise and Tenon
No. 10 Wood Screws 1 1/2" Long
2"
4"
3"x3" Butt Hinges
Cover Frame with 8 oz. Duck. Paint with No. 137 Black Paint
Frame to be made of 2"x 1 1/2" Material
5'2"
5'10"
4"

FIG. 3—PORTABLE HINGED-PANEL SCREEN

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*From 1918 report of committee of Association of Railway Electrical Engineers. While prepared for railway electrical engineers primarily, this report contains much information of value in the electric railway shop or on the track.

ent operators. Special glasses put out under various trade names are also satisfactory.

Since there is a considerable amount of welding to be done in the shops and out in the open on parts that are too heavy to be transferred to a welding booth, sets of portable screens are provided which can be placed at one side or completely around the work on which the welding is being done, to provide protection for other men working in the near vicinity from the light of the arc. The portable screens are made of two panels hinged together, and usually two portable screens for each welder are provided. When it is desired completely to surround a part, two screens will be required. Fig. 3 shows a sketch of such a screen now in use.

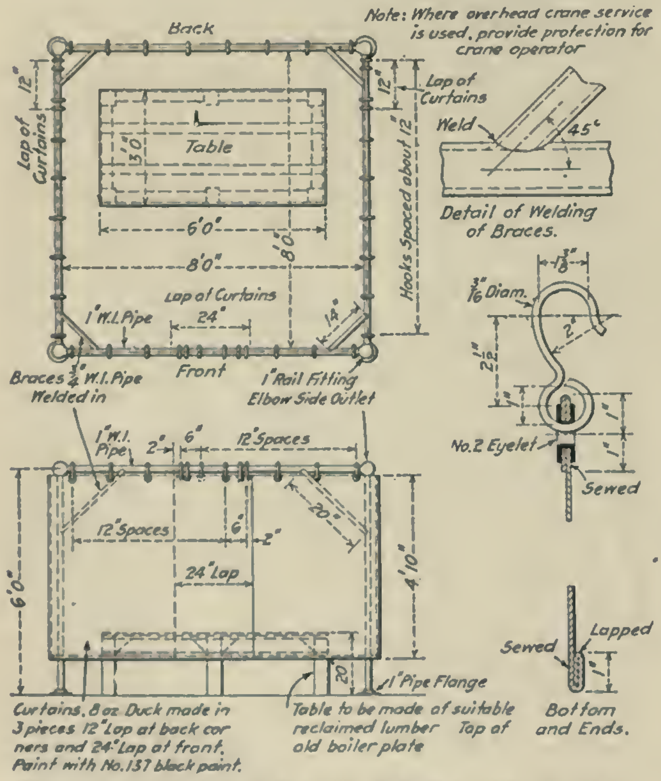

Note: Where overhead crane service is used, provide protection for crane operator
Back
Lap of Curtains
12"
Table
3'0"
6'0"
8'0"
8'0"
Lap of Curtains
24"
1" W.I. Pipe
14"
Hooks Spaced about 12"
Braces 3/4" W.I. Pipe Welded in
Front
1" Rail Fitting Elbow Side Outlet
Weld
45°
Detail of Welding of Braces.
3/16" Diam.
1 3/8"
2"
2 1/2"
No. 2 Eyelet
1"
1"
Sewed
1" W.I. Pipe
2"
6"
12" Spaces
12" Spaces
6"
2"
20"
24" Lap
6'0"
4'10"
20
1" Pipe Flange
Sewed
Lapped
1"
Bottom and Ends.
Curtains, 8 oz. Duck made in 3 pieces 12" Lap at back corners and 24" Lap at front. Paint with No. 137 black paint.
Table to be made of suitable reclaimed lumber Top of old boiler plate

FIG. 4. BOOTH FOR WELDING MISCELLANEOUS PARTS

There should always be one or more stationary welding booths located at some convenient place in the shop, where all the small miscellaneous parts may be brought for welding. Fig. 4 shows a sketch of a booth designed for this purpose. The curtains are hung in such manner as to permit parts to be brought into the booth from any one of the four sides. A space between the table and the curtains is provided to prevent sparks from lodging on, and burning holes in, the latter. The booth may be made smaller than that shown if space is limited.

The work on which welding is to be done forms one of the poles of the circuit, and it is necessary that the connection to the work be secure to aid the flow of the current. The practice in most cases has been to connect the ground wire to a plate, the plate then being laid on the work. This kind of a ground connection is very poor unless the plate is tack-welded to the work. A better method for connecting the ground wire is to use an extra heavy forged clamp having an opening of at least 4½ in., and a threaded bolt that can be tightened down with a wrench.

The ground wire should be permanently connected to the clamp, and the point on the work where the clamp is to be attached should be perfectly clean and bright so as to insure a good connection between the clamp and the work.

For cleaning the dirt and oxides from surfaces on which welding is to take place there is nothing that will do the job quite as well as the sand blast. There are cases where the scale is so heavy and hard that the use of a roughing tool is required to loosen the scale, after which the sand blast is used to remove the small particles untouched by the roughing tool. It is found that a small portable type of sand blast is best suited for this class of work, as it can be taken into restricted spaces, and its weight is not so great but what it can be handled with reasonable ease. Fig. 5 is a sketch of a small sand blast which has been in use for some time and has given good results.

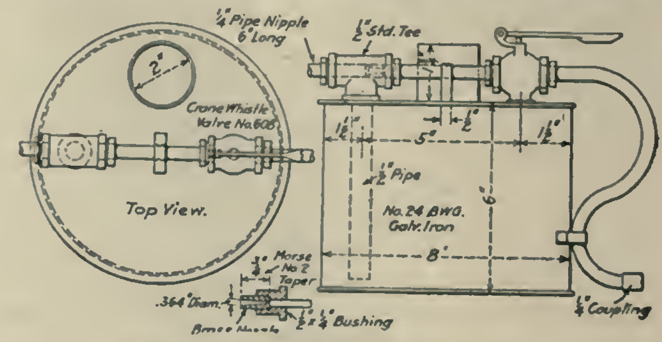


FIG. 5. SMALL SAND BLAST OUTFIT

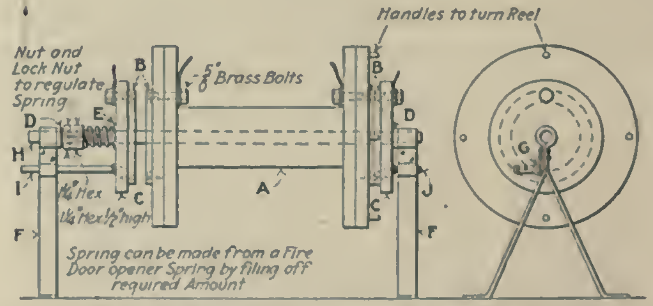

Handles to turn Reel
Nut and Lock Nut to regulate Spring
B
5/8" Brass Bolts
B
D
E
D
H
I
1 1/4" Hex
1 1/4" Hex 1/2" high
C
A
C
J
F
F
G
Spring can be made from a Fire Door opener Spring by filing off required Amount

FIG. 6—CABLE REEL FOR PORTABLE WELDING OUTFITS

As the use of a sand blast is necessary on a large number of the operations, a shield to protect the eyes and skin from the sand is required when the blast is being used. The removal of the colored glasses from one of the face shields, the clear glass being left in place, permits the face shields to serve for this purpose.

For removing dirt and oxides which are very light, two steel wire brushes are provided; one is about 2½ in. wide by approximately 6 in. long, the other is very narrow, approximately 1 in. wide, and 4 or 5 in. long. The narrow brush is used for cleaning in close places.

A selection of carbon blocks and rods should be carried in stock for the purpose of making forms. The blocks are often used as a backing when closing a gap from one side where it is desired that the finished weld be flush and smooth on the opposite side from which the welding was done. The carbon rods are used to insert in holes when it is necessary to do welding on parts which are drilled, without filling in the holes.

When the welding machines are made portable, it is found to be good practice to mount a cable reel on the end of the truck on which the welding circuit cables are wound. The use of a cable reel will preserve the wire and will save considerable time in the handling of the cables.

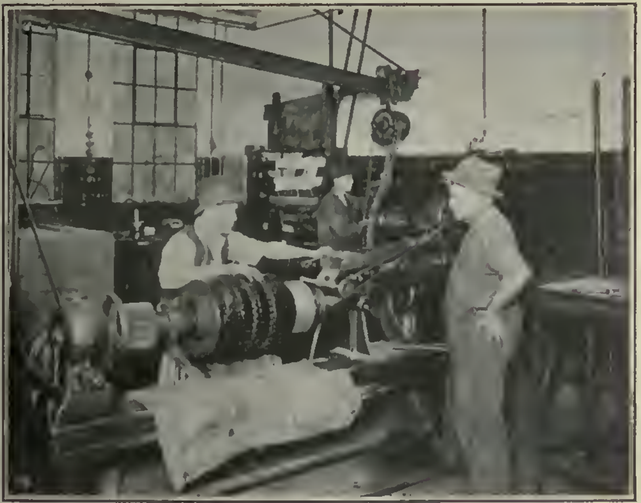
A sketch of a reel designed for this purpose is shown in Fig. 6. Collector rings are placed at each end to provide for the flow of the current between the terminals of the machine and the cable on the reel. A spring is placed at one end to keep the rings firmly in contact with each other. A reel like that shown has been in service for approximately two years without giving any trouble.

System in the Armature Room

An Armature Rack Conserves Space, Facilitates Handling and With Lathes Adjacent to Crane Much Labor Is Saved

By GEORGE E. PELLISSIER
Assistant Manager Holyoke (Mass.) Street Railway

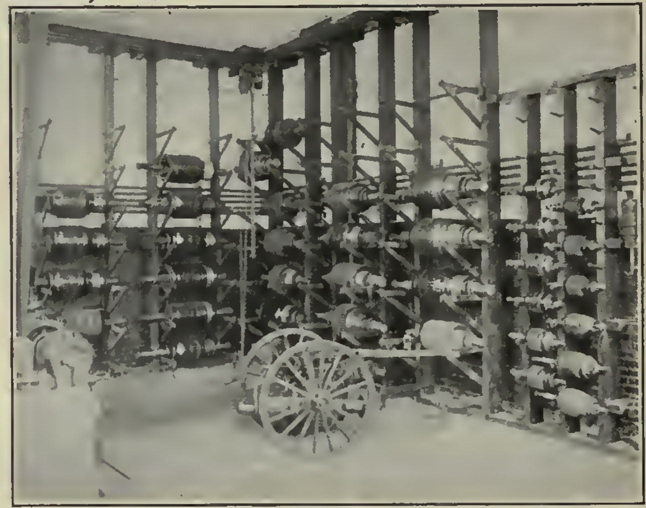
AN ACCOMPANYING illustration shows a type of armature rack which we have at our shop and which has proved of great convenience. The advantages of this particular method of storing armatures lie in the small amount of space taken and the facility with which each armature can be reached by chain block without interfering or damaging other armatures in the rack. To remove an armature it is rolled out to the end of the bracket on which it rests where the sling for lifting it is adjusted, and the armature can then be lifted out with the home-made traveling hoist which serves the rack. After the armature is dropped it is picked up by the armature buggy and carried to the motor for installation.



CORNER OF SHOP USED FOR BANDING ARMATURES AND TURNING AND SLOTTING COMMUTATORS

This rack will accommodate thirty-five armatures with one on each pair of brackets, and seventy armatures with two on each pair of brackets. The rack for storing air-compressor armatures shown at the right in the photograph will store twenty armatures.

In the construction of this rack we used 3-in. x 8-in. wooden uprights to which the brackets were attached by ⅝-in. bolts. The top pieces of the brackets were made of 2-in. x ⅝-in. strap iron and the braces were 2 in. x ½ in. The brackets extended out a distance of 20 in. from the uprights and the top piece was installed with ¼-in. pitch to prevent the armatures rolling towards the end. The ends of braces also projected above the top surface to act as a stop. The uprights were set out from the wall a sufficient amount to clear the steam pipes which may be seen in the illustration.



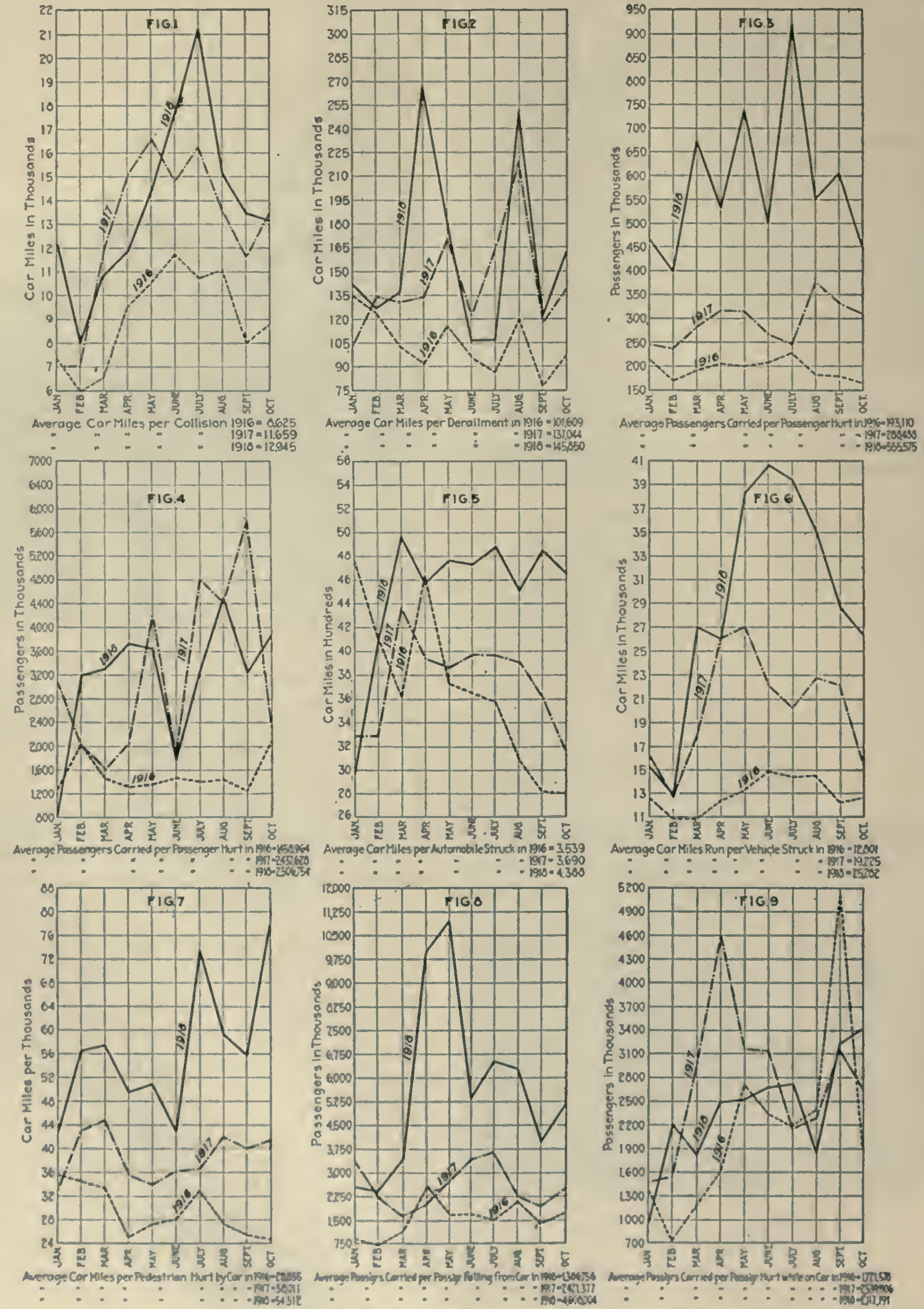
ARMATURE STORAGE RACK OF THE HOLYOKE STREET RAILWAY

By installing a machine for banding armatures and slotting the commutators adjacent to the lathe used for turning down commutators the same jib crane is used to serve both machines.

One of the accompanying illustrations shows the arrangement, together with the banding and slotting machine used which was made by the American General Engineering Company, New York City.

A. S. M. E. Takes Over the Engineering Index

THE American Society of Mechanical Engineers, 29 West Thirty-ninth Street, New York City, has acquired the engineering index formerly published by the *Engineering Magazine* and later by its successor, *Industrial Management.* The society will issue the index in three forms: As a part of the journal, as a separate monthly publication and as an annual volume. This famous index originated with Prof. J. B. Johnson of Washington University in 1883. For twelve years it was prepared under his direction and for the following twenty-five years had the personal attention of John R. Dunlap, president of the Engineering Magazine Company. The index will be published with the following classifications: Mechanical engineering, thirty-one subheads; electrical engineering, eleven subheads; civil engineering, nine subheads; mining engineering, fourteen subheads; metallurgy, seven subheads; aeronautics, nine subheads; marine engineering, four subheads; organization and management, thirteen subheads; industrial technology; railroad engineering, fifteen subheads; munition and military engineering; general science, three subheads.



GRAPHICAL RECORD OF SAFETY OF SKIP-STOP OPERATION IN DETROIT

Fig. 1—Chart showing car-miles run per collision of cars.
Fig. 2—Chart showing car-miles run per derailment of cars.
Fig. 3—Chart showing passengers carried per passenger hurt in boarding and alighting.
Fig. 4—Chart showing passengers carried per passenger hurt otherwise than by boarding and alighting.
Fig. 5—Chart showing car-miles run per automobile struck.
Fig. 6—Chart showing car-miles run per vehicle struck (including animals but excepting automobiles).
Fig. 7—Chart showing car-miles run per pedestrian hurt.
Fig. 8—Chart showing passengers carried per passenger falling from car.
Fig. 9—Chart showing passengers carried per passenger hurt while on car.

Skip Stops Spell Safety

Records from Detroit Are Quoted to Show that the Skip Stop Means Greater Safety to the Passenger as Well as to the Vehicle and Pedestrian on the Street—The Data Are Shown Graphically and Cover Ten Months in 1916, 1917 and 1918

BY E. J. BURDICK
Assistant General Manager Detroit United Railway

AS ALL of us know, every progressive measure appertaining to street railway operation meets with opposition—sometimes with those of the craft, I am sorry to state; more often, because more naturally, the opposition comes from the public.

Of these progressive measures probably none has been so bitterly attacked as skip-stop operation, and without sane reason, for such operation is conservation of great import and of the highest type.

I feel certain now that all operating officials, and certainly the public where the system is effective, fully appreciate the conservation of time. The engineering staff of the National Fuel Administration has most thoroughly demonstrated that the system is a great conserver of fuel. Our own records prove conclusively that skip-stop operation in densely-populated communities is a most important reducer of accidents.

Surely, then, a measure conserving all these things I have mentioned is entitled to a vigorous propaganda until it becomes a fixed and settled institution throughout the country.

From the very first study I gave to this method of operation I was convinced of its usefulness as a safety-first measure. The deeper I went into it the more this feature appealed to me, and the longer skip-stop operation has been in effect upon the city service lines of the Detroit United Railway the greater the proof piled up.

The figures given herein and the charts prepared therefrom are based upon the actual records of the company as to car mileage, passengers carried and accident reports, major and minor, filed with our claims department. The population figures are the estimates from the issuers of our city directory, and the figures of automobile licenses issued are officially from the State authorities, as issued to the residents of Detroit. They cannot, of course, include automobiles from other communities that traverse our streets, but this has no basis in the comparison as the conditions thereto have been the same during the period under discussion.

In 1916 Detroit did not have skip-stop operation; in 1917 there was partial skip-stop operation, and throughout 1918 there has been full skip-stop operation.

It should be borne in mind that throughout the years referred to there has been no difference in the other well-recognized measures of safety. In all three years there have been safety zones, near-side stops and safety-step cars (though these have been added to, there being an increase in 1917 over 1916). On the other hand, the class of platform men deteriorated with us as with others, due to war enlistments and profiteering labor shifts, and it is safe to say that had the force of platform men of 1918 been of the standard of ability prevailing in 1916 the advantage of the skip stop as a measure of safety would have been even more startlingly illustrated. The figures I give are for the first ten-month period of the years mentioned.

For the first ten months of 1916 within the one-fare zone we carried 1,458,964 passengers for every one injured. With skip-stop operation gradually developing in 1917 the factor of safety increased to one injury for every 2,437,628 passengers, and in 1918 under adverse labor conditions becoming much worse we carried safely 2,506,754 passengers to one hurt.

Similar evidence of safety by skip-stop operation is demonstrated by comparing the number of car-miles operated to every collision between street cars:

AVERAGE NUMBER OF CAR-MILES OPERATED TO EVERY CAR COLLISION

Non-skip-stop, 1916	8,625 car-miles
Partial skip-stop, 1917	11,659 car-miles
Complete skip-stop, 1918	12,945 car-miles

And this is despite the labor conditions!

Opponents of skip-stop operation have often muddled themselves as between increased speed and decreased running time due to the elimination of stops and hence less wastage through acceleration, and have feared that faster operation would increase the element of danger. There has, of course, been no increase of maximum speed so that their fears are unfounded.

A corollary to the collisions between the company cars may be taken as the collisions between the company cars and the growing number of automobiles. Here again is ample proof of the safety to be found in the skip stop.

In 1916 we operated 3539 car-miles to every automobile struck; in 1917 this was increased to 3690 car-miles and in 1918 to 4388 car-miles. Certainly the observation of none of us can possibly lead to the credit going to any increasing care being taken by the mass of automobile drivers.

Again proof of the safety to be found in skip-stop operation through the elimination of the number of places where passengers may board and alight is most clearly shown in the number of accidents of platform nature—those in boarding or alighting. Here is the table of comparison:

AVERAGE NUMBER OF PASSENGERS CARRIED PER PASSENGER INJURED IN BOARDING OR ALIGHTING

Non-skip-stop, 1916	193,110 passengers
Partial skip-stop, 1917	288,488 passengers
Complete skip-stop, 1918	555,575 passengers

The detailed tables follow, Table I showing the same data as Fig. 1, Table II as Fig. 2, etc. No especial explanation is required as to their compilation except possibly with Tables V and VII, shown graphically in Figs. 5 and 7. In determining the proper allowance in Table V, for the increasing number of automobiles in use, the number of licenses issued for 1918 was taken as the unit 1.00. It was then found that the number in 1917 was 0.82 of the 1918 figure and that in 1916 it was 0.66 of the 1918 figure. These constants, multiplied by the passenger car-miles for their respective year, were taken as giving the relation of the passenger car-miles each year one to the other. This result is divided by the number of "automobiles struck" to determine the car-miles per automobile struck. The same general plan was followed in Table VII, which gives the car-miles run per pedestrian hurt. The population in 1918 was taken as the unit 1.00, and it was found that the unit constant for the population in 1916 was 0.83, and for the population in 1917 was 0.92. These constants, multiplied by the passenger car-miles for their respective year, give the relation of the passenger car-miles each year one to the other. This result is divided by the number of "pedestrians hurt by car" to determine the car-miles run per pedestrian hurt by car.

Surely, skip stop means "safety first."

TABLE I—SHOWING CAR-MILES RUN PER CAR COLLISION

Month	1916		1917		1918	
	Pass. Car-Miles	C.M. per Collision	Pass. Car-Miles	C.M. per Collision	Pass. Car-Miles	C.M. per Coll'n
January	3,092,395	7,311	3,696,929	7,015	3,395,650	12,348
February	2,962,281	5,960	3,337,579	7,056	3,166,590	7,956
March	3,186,272	6,516	3,939,313	11,937	3,560,089	10,854
April	3,112,040	9,546	3,605,150	15,084	3,216,331	11,868
May	3,257,674	10,509	3,761,212	16,569	3,456,461	14,342
June	3,186,853	11,716	3,658,864	14,753	3,300,340	17,649
July	3,282,132	10,726	3,743,624	16,206	3,310,871	21,224
August	3,351,320	11,060	3,739,385	13,548	3,262,398	15,104
September	3,350,306	8,015	3,523,197	11,589	3,065,026	13,443
October	3,631,965	8,773	3,509,600	13.498	3,082,483	13,117
Total	32,413,238	8,625	36,316,853	11,659	32,816,239	12,945

TABLE II—SHOWING CAR-MILES RUN PER CAR DERAILMENT

Month	1916		1917		1918	
	Pass. Car-Miles	C.M. per Derailment	Pass. Car-Miles	C.M. per Derailment	Pass. Car-Miles	C.M. per Derailment
January	3,092,395	134,452	3,696,929	102,692	3,395,650	141,485
February	2,962,281	123,428	3,337,579	133,503	3,166,590	126,664
March	3,186,272	102,783	3,939,313	131,310	3,560,089	136,927
April	3,112,040	91,531	3,605,150	133,524	3,216,331	268,028
May	3,257,674	116,346	3,761,212	170,964	3,456,461	181,919
June	3,186,853	96,571	3,658,864	121,962	3,300,340	106,462
July	3,282,132	86,372	3,743,624	162,766	3,310,871	106,802
August	3,351,320	119,690	3,739,385	219,964	3,262,398	250,953
September	3,350,306	77,914	3,523,197	117,440	3,065,026	122,601
October	3,631,965	98,161	3,509,600	140,384	3,082,483	162,236
Total	32,413,238	101,609	36,316,853	137,044	32,816,239	145,850

TABLE III—SHOWING PASSENGERS CARRIED PER PASSENGER HURT IN BOARDING AND ALIGHTING

Month	1916		1917		1918	
	Passengers Carried		Passengers Carried		Passengers Carried	
	Total	Per Pass. Hurt	Total	Per Pass. Hurt	Total	Per Pass. Hurt
January	31,732,257	215,866	37,097,629	247,318	30,373,116	467,279
February	30,303,538	171,206	33,867,547	238,504	28,668,032	398,167
March	33,690,601	191,424	38,278,999	283,548	32,904,264	671,516
April	33,692,728	206,704	36,770,852	316,990	29,799,500	532,134
May	35,476,121	200,430	37,920,658	316,005	32,734,744	743,971
June	35,194,325	209,490	36,817,210	268,739	31,974,760	499,606
July	34,922,954	228,255	36,697,586	247,957	32,525,219	929,292
August	35,848,273	183,837	36,376,844	378,925	31,469,892	552,103
September	36,217,310	180,186	34,808,529	334,697	32,138,851	606,393
October	37,237,442	164,767	34,570,768	310,547	30,755,893	445,737
Total	344,315,349	193,110	363,206,622	288,488	313,344,271	555,575

TABLE IV—SHOWING PASSENGERS CARRIED PER PASSENGER HURT OTHERWISE THAN BY BOARDING AND ALIGHTING

Month	1916		1917		1918	
	Passengers Carried		Passengers Carried		Passengers Carried	
	Total	Per Pass. Hurt	Total	Per Pass. Hurt	Total	Per Pass. Hurt
January	31,732,257	1,269,290	37,097,629	3,091,469	30,373,116	843,697
February	30,303,538	2,020,236	33,867,547	1,992,208	28,668,032	3,185,337
March	33,690,601	1,464,809	38,278,999	1,594,958	32,904,264	3,290,426
April	33,692,728	1,295,874	36,770,852	2,042,825	29,799,500	3,724,938
May	35,476,121	1,364,466	37,920,658	4,213,406	32,734,744	3,637,194
June	35,194,325	1,466,430	36,817,210	1,840,860	31,974,760	1,776,375
July	34,922,954	1,396,918	36,697,586	2,822,891	32,525,219	3,252,522
August	35,848,273	1,433,931	36,376,844	2,425,123	31,469,892	4,495,699
September	36,217,310	1,248,873	34,808,529	5,801,422	32,138,851	3,213,885
October	37,237,442	2,068,747	34,370,768	2,304,718	30,755,893	3,844,488
Total	344,315,549	1,458,964	363,206,622	2,437,628	313,344,271	2,506,754

TABLE V—SHOWING CAR-MILES RUN PER AUTOMOBILE STRUCK

Month	1916		1917		1918	
	Pass. Car-Miles	C.M. per Auto Struck	Pass. Car-Miles	C.M. per Auto. Struck	Pass. Car-Miles	C.M. per Auto. Struck
Jan.	3,092,395x0.66	4,791	3,696,929x0.82	3,288	3,395,650x1.0	2,943
Feb.	2,962,281x0.66	4,116	3,337,579x0 82	3,282	3,166,590x1.0	4,044
Mar.	3,186,272x0.66	3,626	3,939,313x0.82	4,365	3,560,089x1.0	4,951
Apr.	3,112,040x0 66	4,636	3,605,150x0.82	3,942	3,216,331x1 0	4,569
May	3,257,674x0 66	3,734	3,761,212x0.82	3,860	3,456,461x1 0	4,761
June	3,186,853x0.66	3,645	3,658,864x0 82	3,974	3,300,340x1 0	4,735
July	3,282,132x0.66	3,569	3,743,624x0.82	3,961	3,310,871x1.0	4,883
Aug.	3,351,320x0 66	3,085	3,739,385x0.82	3,911	3,262,398x1 0	4,512
Sept.	3,350,306x0.66	2,820	3,523,197x0.82	3,602	3,065,026x1.0	4,850
Oct.	3,631,965x0 66	2.804	3,509,600x0 82	3,162	3,082,483x1 0	4,656
Total	32,413,238x0.66	3,539	36,316,853x0.82	3,690	32,816,239x1 0	4,388

	1916	1917		1918
Automobiles	28,050 = 66 per Cent.		of	42,500
Automobiles		34,850 = 82 per	Cent. of	42,500

TABLE VI—SHOWING CAR-MILES PER VEHICLE STRUCK (INCLUDING ANIMALS AND EXCEPTING AUTOS)

Month	1916		1917		1918	
	Pass. Car-Miles	C.M. per Vehicle Struck	Pass. Car-Miles	C.M. per Vehicle Struck	Pass. Car-Miles	C.M. per Vehicle Struck
January	3,092,395	12,622	3,696,929	16,214	3,395,650	15,227
February	2,962,281	10,971	3,337,579	12,690	3,166,590	12,820
March	3,186,272	10,949	3,939,313	17,906	3,560,089	26,970
April	3,112,040	12,448	3,605,150	26,124	3,216,331	25,938
May	3,257,674	13,351	3,761,212	27,059	3,456,461	38,405
June	3,186,853	14,892	3,658,864	22,175	3,300,340	40,744
July	3,282,132	14,459	3,743,624	20,236	3,310,871	39,415
August	3,351,320	14,571	3,739,385	22,663	3,262,398	35,080
September	3,350,306	12,227	3,523,197	22,158	3,065,026	28,645
October	3,631,965	12,655	3,509,600	15,461	3,082,483	26,346
Total	32,413,238	12,801	36,316,853	19,225	32,816,239	25,282

TABLE VII—SHOWING CAR-MILES PER PEDESTRIAN HURT BY CAR

Month	1916		1917		1918	
	Pass. Car-Miles	C.M. per Pedest. Struck	Pass. Car-Miles	C.M. per Pedest. Struck	Pass. Car-Miles	C.M. per Pedest. Struck
Jan.	3,092,395x0.83	35,648	3,696,929x0.92	32,704	3,395,650x1.0	42,446
Feb.	2,962,281x0.83	34,565	3,337,579x0.92	43,107	3,166,590x1.0	56,546
Mar.	3,186,272x0 83	33,476	3,939,315x0.92	44,743	3,560,089x1 0	57,421
Apr.	3,112,040x0.83	25,078	3,605,150x0 92	35,664	3,216,331x1.0	49,482
May	3,257,674x0.83	27,312	3,761,212x0 92	33,925	3,456,461x1.0	50,830
June	3,186,853x0.83	28,139	3,658,864x0 92	36,195	3,300,340x1.0	42,861
July	3,282,132x0.83	32,821	3,743,624x0.92	36,398	3,310,871x1 0	73,574
Aug.	3,351,320x0.83	27,541	3,739,385x0.92	41,954	3,262,398x1.0	59,316
Sept.	3,350,306x0.83	25,420	3,523,197x0 92	40,017	3,065,026x1.0	55,728
Oct.	3,631,965x0.83	24,709	3,509,600x0.92	41,395	3,082,483x1 0	79,038
Total,	32,413,238x0.83	28,835	36,316,853x0.92	38,011	32,816,239x1 0	54,512

Population	1916 = 83 per Cent of 1918	1917 = 92 per Cent of 1918	1918 = 100 per Cent
Detroit	820,778	914,896	986,699
Highland Park	25,000	27,123	39,000
Hamtramck	21,520	20,000	20,000
St. Clair Heights	10,000	13,000	13,000
	876,298	975,021	1,058,699

TABLE VIII—SHOWING PASSENGERS CARRIED PER PASSENGER FALLING FROM CAR

Month	1916		1917		1918	
	Passengers Carried		Passengers Carried		Passengers Carried	
	Total	Per Pass. Falling	Total	Per Pass. Falling	Total	Per Pass. Falling
January	31,732,257	881,452	37,097,629	3,372,512	30,373,116	2,331,093
February	30,303,538	739,111	33,867,347	2,257,836	28,668,032	2,389,003
March	33,690,601	1,161,745	38,278,999	1,664,304	32,904,264	4,113,033
April	33,692,728	2,591,748	36,770,852	2,042,825	29,799,500	9,933,167
May	35,476,121	1,689,339	37,920,658	2,708,618	32,734,744	10,911,581
June	35,194,325	1,675,920	36,817,210	2,342,019	31,974,760	5,329,127
July	34,922,954	1,518,389	36,697,386	3,669,759	32,525,219	6,505,044
August	35,848,273	2,108,722	36,376,844	2,273,353	31,469,892	6,293,978
September	36,217,310	1,392,973	34,808,329	1,933,807	32,138,851	4,017,358
October	37,237,442	1,773,212	34,570,768	2,469,340	30,755,893	3,125,982
Total	344,315,349	1,386,756	363,206,622	2,421,377	313,344,271	4,608,004

TABLE IX—SHOWING PASSENGERS CARRIED PER PASSENGER HURT WHILE ON CAR

Month	1916		1917		1918	
	Passengers Carried		Passengers Carried		Passengers Carried	
	Total	Per Pass. Hurt	Total	Per Pass. Hurt	Total	Per Pass. Hurt
January	31,732,257	1,379,663	37,097,629	1,483,905	30,373,116	949,160
February	30,303,538	721,513	33,867,347	1,539,434	28,668,032	2,205,233
March	33,690,601	1,161,745	38,278,999	2,944,538	32,904,264	1,828,015
April	33,692,728	1,604,416	36,770,852	4,596,357	29,799,500	2,483,292
May	35,476,121	2,707,556	37,920,658	3,160,055	32,734,744	2,518,057
June	33,194,325	2,346,288	36,817,210	6,136,202	31,974,760	2,664,563
July	34,922,954	2,182,685	36,697,586	2,158,682	32,525,219	2,710,435
August	35,848,273	2,389,885	36,376,844	2,273,554	31,469,892	1,851,170
September	36,217,310	5,173,901	34,808,529	3,164,412	32,138,851	3,213,885
October	37,237,442	1,959,865	34,570,768	2,659,290	30,755,893	3,417,321
Total	344,315,549	1,721,578	363,206,622	2,539,906	313,344,271	2,117,119

Service at Cost for Youngstown

M. & S. Line Secures New Twenty-Five Year Franchise With Initial Fare of Five Cents and Penny for Transfer

THE city of Youngstown, Ohio, has released the Mahoning & Shenango Railway & Light Company from its obligation to furnish transportation at the rate of six tickets for a quarter, and it has granted the company a renewal of railway rights for twenty-five years on the service-at-cost plan. The new franchise is effective from Jan. 16. The old grant still had fifteen years to run.

The action of the city ends a controversy between the company and it on the subject of service and a more recent dispute between the company and its employees regarding wages. The company contended that its revenue from six-for-a-quarter fares was inadequate under present service and high costs. The trainmen last September threatened to suspend work unless their wages were increased. The city engaged Peter Witt, former street railroad commissioner of Cleveland, who investigated and reported that the company was unable to meet either the service or wage requirements on its present revenues.

BASIS FOR RATE OF RETURN

For purposes of the ordinance, the value of the property covered was agreed to be $4,000,000. On this the return to the company will be made monthly from the stabilizing fund at the rate of 7 per cent per annum. Return on additions to capital value is to be made at the rate per cent at which the company in good faith is able to secure the money for such additions.

The capital value thus determined and the return thereon should not be confused with the existing capitalization of the owning company. The corporate rights of the company are unabridged. The settlement is, in effect, a lease of the property at a fixed rental with option to purchase, lessor and lessee being partners in the leasehold. Should the company organize a new corporation to take over the property covered by the ordinance and give opportunity to Youngstown citizens to purchase stock of such new company at its par value, the capital of the proposed new corporation being limited to the then capital value of the segregated property, the city binds itself in the event of purchase to pay 10 per cent additional to the capital value at the time of purchase, unless this be at the expiration of the grant. No plans at present are being made for the formation of such a corporation.

The salient features of the new Youngstown franchise are:

1. *City Supervision:* City fixes schedules, routes, character of cars, amount of service, but should company's return be threatened under rate of fare in force or under any higher rate by service requirements, arbitration may be had. City inspects and approves accounting, disagreements to be submitted to committee on standard classification of accounts of the American Electric Railway Accountants' Association. City may check and supervise all additions and betterments, and the cost of same shall not be added to capital value except on its approval. Salary of Street Railroad Commissioner is not to exceed $600 a month, and those of assistants $900 per month.

2. *Arbitration:* Any difference arising must be arbitrated save with respect to capital value, fixed return to company, methods of accounting, and city's right to prescribe service except when company's return is threatened. Arbitration board forms quickly. Party demanding arbitration may name board on fourth day after demand if other party does not join. Both parties naming representatives, the United States District Judge for the Youngstown district names third arbitrator if first two cannot agree on third within three days. Board must decide question within twenty days from date of appointment of third arbitrator or unanimously agree to extension of time. Expenses of arbitration are fixed by board as part of award and paid as operating cost unless in excess of $1000 in any six months' period, when they shall be paid from the stabilizing fund. Questions arbitrated may not be arbitrated again within three months from date of first finding. Failure to comply with award is penalized: if on city's part, the rate of return to the company increases; if on the company's part, the rate decreases—in neither instance more than 1 per cent.

3. *Allowances:* For operating costs, 22 cents per car mile is allowed for motor-cars and 60 per cent of trailer-car mileage; and for maintenance, repair and renewal costs, 8 cents per car mile for motor-cars and 60 per cent of trailer-car mileage. Should gross revenue at any time be insufficient to pay these allowances, deficiency shall be taken from stabilizing fund. Any residue of the operating cost allowance unexpended at the end of each calendar year shall be transferred to the stabilizing fund. Either allowance may be increased or decreased by agreement or arbitration.

4. *Stabilizing Fund:* This is constituted by setting aside $100,000 of the agreed capital, credited monthly with interest earned thereon, to which are added monthly the gross receipts of the property less the allowances noted above. From this fund is paid monthly the 7 per cent return to the company, as well as taxes as they become due.

5. *Rates of Fare:* Nine rates of fare are provided, with more possible. A charge of 1 cent for transfer is made under each rate. The scale follows:

A	3 cents cash,	nine tickets for 25 cents
B	5 cents cash,	eight tickets for 25 cents
C	5 cents cash,	seven tickets for 25 cents
D	5 cents cash,	six tickets for 25 cents
E	5 cents cash,	no tickets
F	6 cents cash,	nine tickets for 50 cents
G	7 cents cash,	eight tickets for 50 cents
H	8 cents cash,	seven tickets for 50 cents
I	9 cents cash,	six tickets for 50 cents

At such time as Rate B becomes effective, Council shall establish a further lower rate bearing the same relation to Rate A as Rate A bears to Rate B, and should Rate H become effective Council shall establish a further higher rate bearing the same relation to Rate I as Rate I bears to Rate H, to the end that there shall always be two rates of fare higher or lower than the fare in effect.

Rate E, 5 cents cash and 1 cent for a transfer, will be the initial rate. Whenever the amount in the stabilizing fund at the end of any calendar month exceeds $150,000 the next lower rate becomes effective; whenever the amount in the stabilizing fund is reduced to $50,000, the next higher rate becomes effective. Should such change fail to reduce the balance in the stabilizing fund below $150,000 at the end of the next calendar month after change is made, then the next lower rate becomes effective, and so on until the balance in the stabilizing fund is reduced to $150,000. The rate of fare then in effect shall remain until the fund is reduced to $50,000. Similarly, the fare shall be increased monthly when the fund is less than $50,000 until it is more than $50,000. The rate then in effect shall remain until the fund exceeds $150,000.

The fare may be changed by agreement but not by arbitration; changes must be automatic, dependent upon the balance in the stabilizing fund. Whenever a change in rate is made, tickets under former rate are not acceptable as fares, and they are redeemable only within thirty days from date of change at any office of company at cost. School or special tickets may be sold at rate to be fixed by city and company, but such tickets are invalid Sundays and holidays and between the hours of 4.30 p.m. and 7.30 a.m. on week-days. Any child under six years of age accompanied by person paying fare shall be carried free; two such children shall pay for a single fare. Free transportation is limited to motormen, conductors, linemen, shopmen and trackmen, going to or returning from work.

6. *General Provisions:* The company must maintain all pavements within outer rails and 1 ft. outside each outer rail, but it shall not be required to pave or repave except where repaving is necessitated by reconstruction of track or building of extensions. In the former case, such repaving shall be charged to maintenance, repair and renewal account and in the latter to the cost of the extension. All expenses of change in tracks and paving necessitated by public improvements shall be paid by the city. Damage claims arising in connection with work or improvements shall be considered part of the cost of such work and paid for out of funds and added to capital value.

The company shall charge to operating costs a rental for offices, supplies and equipment used under the new plan, the amount to be fixed by agreement between the company and the city. Outstanding damage claims against property covered by the ordnance shall be charged to operating cost. The company's portion of grade crossing eliminations shall be paid by the company and added to capital value. Either the company or the city may propose extensions, but the city loses this right whenever the unexpired term of the franchise is less than fifteen years. Any replacements in excess of the cost new of the property replaced shall be capitalized to the extent of such excess cost, the balance being charged to maintenance account. Additions to capital value shall be at the par value of the securities sold or debt created for the extension or betterments.

PLANS FOR SPEEDING UP SERVICE

During the consideration of the new grant, the company joined the city in working out re-routing and stop-elimination plans to speed up service. All lines were terminated at the center of the city, known locally as the "Diamond," and operating supervision was established at that point.

Because of the lateness of the season, however, and the impossibility of securing all of the needed special work for the change the complete layout for the "Diamond," which includes waiting rooms and loading platforms, was deferred. Temporary rooms have been constructed, however, and cars are now operating on routes and past the points scheduled in the new plan.

Mayor A. W. Traver has named W. L. Sause, former Director of Public Service, as City Street Railroad Commissioner. The pay-leave system of fare collection will be used on out-bound cars and the pay-enter system inbound. The company is pledged to the immediate conversion of such of its cars as do not now permit the use of this system.

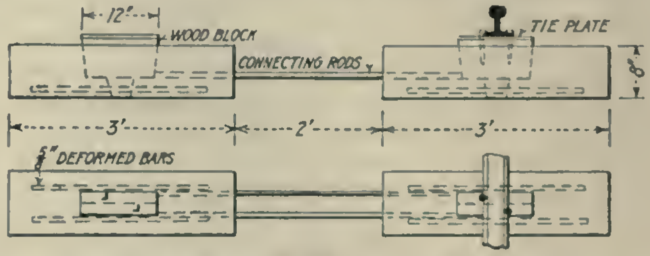
Paper Substitutes for Driving Belts in Germany

Foreign papers state that machine-driving belts made of paper substitute are being introduced in German workshops. The belts are woven or braided and may be either of the paper fabric or paper thread type. The paper fabric is first cut into bands and a core of strengthening material, either cotton or sheet metal, is interposed. The core is surrounded with paper strips and the whole sewn with strong thread. The tensile strength of the woven belt is stated to reach from 550 to 700 lb. per inch width.

New Type of Track Tie

UP TO the present time wood or steel ties have been used quite generally in track construction. Concrete, however, has considerable possibility as a tie material, and a specially constructed tie, developed by Edgar N. Goodlett, is worthy of study. Quantities of ties of this type have now been in experimental service for four years and are reported to be giving good satisfaction.

This special tie is made up of two reinforced-concrete end sections. Each end block is 10 in. x 36 in. face and 8 in. deep and the blocks are held together by two steel rods. In the middle of each face is an open slot 4 in. x 12 in. at the top and going down at a slight bevel to a 3½-in. x 11½-in. seat at the bottom. The rail is spiked in the usual manner to wooden blocks which are inserted in the slots. These blocks protrude about 1 in. above the concrete and take the weight of rail, providing resilience. The open construction and the wooden spiking blocks are said to overcome the objections which have been made against the use of concrete ties. In service the wooden block inserts compress into the beveled recesses, conducing to durability and increasing the spike holding power of the ties.



DETAILS OF CONCRETE TIE CONSTRUCTION

NEW TYPE OF CONCRETE TRACK TIE
At left, ties in place ready for ballasting on the Municipal Railway of San Francisco. At right, stretch of track with concrete ties on the Oakland, Antioch & Eastern Railway

Repair work with these ties is very simple. To remove the wooden insert a bar is placed between the two joining rods and the tie is pried over onto its side. A hole in the tie running through the bottom permits the introduction of a tool by which the wooden block can be driven out and a new one inserted. The tie can then be again turned over and adjusted for service. As the wood block insert is protected by the concrete, its life should be much greater than that of the ordinary wood ties. The reinforced-concrete structure is practically permanent.

These ties have been tested by the Municipal Railway of San Francisco, by the Southern Pacific Railroad, and by the Oakland Antioch & Eastern Railway. The accompanying illustrations show some typical construction.

What the Governors Say

Public Opinion Is Usually Reflected Accurately in the Messages of the Chief Executives of the States to the Legislatures

NOT since the cycle of economic legislation which started more than ten years ago and ushered in the system of state regulation of the utilities as it stands at present have the sessions of the legislatures of the many states been looked forward to with more concern than they are this year. The electric railway situation is acute. In many cases fair play to the utilities is possible only after legislation. Thus the legislatures, more than ever, would seem to be the destiny that will help to shape the ends of the industry at this time. The legislative directing force in most cases will be the Governors. The instances are few in which their messages do not sense or reflect public feeling accurately. For this reason the ELECTRIC RAILWAY JOURNAL plans to publish extracts from the messages promptly as received. This week there follow remarks of the Governors of New York, Massachusetts and Connecticut.

ONE STRONG COMMISSION AND MUNICIPAL OWNERSHIP DESIRED IN NEW YORK

Governor Smith of New York, in his inaugural address, declared for a single headed public service commission and for municipal ownership. He said in part:

There is widespread dissatisfaction, particularly in New York City, with the Public Service Commissions. In the First District, a radical change should be made in the structure of the commission itself, if it is to accomplish results. At the time of its formation, in 1907, there was expressed grave doubt as to whether or not it would work out well. There were many who believed that the function of constructing rapid transit railroads for the city of New York should be divorced from the function of regulating public utility corporations generally. In my opinion, experience has demonstrated that they were right.

For years the trend in New York City, as well as in the State, has been toward single headed commissions, to the end that the responsibility may be fixed upon one man. During the recent war, the federal government taught us the lesson that results can best be obtained by a single executive, clothed with proper power, when any great work is to be carried out successfully. What we do in time of trouble is brought about by the very best judgment we can exercise. Why is it not sound in time of peace?

It is my belief that the subway rapid transit system of the city of New York can be built better and quicker under the direction of a rapid transit commissioner whose entire time, brains and energy would be devoted to the completion of the subway system. The regulatory functions of the commission in the First District also might be performed by a single public service commissioner. Not only will this result in an economy of administration but it will be productive of results. The argument has been made that a separation of the functions of the commission might interfere with the work. This I do not believe to be the fact.

I therefore recommend that legislation be enacted to bring about this change, and I make this recommendation after years of observation.

Upon the same principle outlined above, I also believe that the affairs of the Public Service Commission in the Second District will be more economically and more efficiently managed by a single headed commission, and I recommend that legislation be enacted to bring this about.

I further call your attention to the weakness of the law itself in not giving to the commissions sufficient power to enforce their orders. These weak spots history has taught us seem to have been inserted for the benefit of the corporations to be regulated. Without enumerating them in detail in this message, I would refer you to that part of the report of the joint legislative committee, appointed to investigate the Public Service Commissions transmitted to the Legislature on March 10, 1915, and I ask you to enact such legislation as will remedy these defects and strengthen the arm of the commissions that they may more effectively carry out the functions for which they were organized.

Recent years have been marked by a great opening of the popular mind to the true scope of enlightened municipal administration. There is everywhere a recognition that it is only through the application of progressive conceptions of public duty that life can be made tolerable in our teeming cities with their unprecedented growth in population and the consequent living conditions.

From every city in the State, represented by their chief executives in conference, there comes the demand that the State confer upon the cities the power to acquire, own, operate and control their public utilities. The supply of transportation, light, heat and power is of the utmost importance to each local community. The services rendered have become a necessity to the life, health, comfort, convenience and industry of the cities. These great services are monopolies, and whatever is of necessity a monopoly should be a public monopoly, especially where it offers a service of universal use.

I therefore recommend that legislation be passed granting to our cities the power to acquire, own, operate and control their public utilities.

RAILWAYS IN MASSACHUSETTS SHOULD BE ON ENDURING BASIS

Governor Coolidge of Massachusetts says that public ownership is no answer to the electric railway problem, as it would not increase revenue. The Governor turned to the electric railway situation after touching upon railroad questions. He said:

But this (steam railroad problem) is not so urgent as the *street railway problem*. While sufficient data are not at hand for a final and complete solution, and conditions are changing much from day to day, yet there are some things which are apparent and which must be kept in mind seeking a remedy. Street railway service in some form is now a public necessity. It ought to be supplied at moderate rates of fare to workers, to children and to the public generally. It has been provided as a private enterprise. It was expected to be more profitable than it ever turned out to be, and for that reason, and because it used the public street, certain extra taxes were laid on it, and conditions requiring expense were often attached to grants of location.

The problem is where to get more money. There are only two sources—increased fares and the public treasury, directly by grant or indirectly by remission of taxes or other payments. Public ownership is no answer to this problem, as it would increase no revenue. The question is one of our needs and our duty, and must be squarely met. As a business enterprise the government desires its success, but no more so than any other private enterprise. As a public necessity the government is warranted in giving aid. As it is a public enterprise the public ought to realize that whatever revenue it has they must furnish. Fares have been increased, but in some places there is no rate high enough to pay for operation, for raising rates too high diminishes the number of passengers.

So long as a street railway can be operated with fair service, paid for by its patrons, it is on a sound and enduring basis. That ought to be the standard. The moment that is abandoned there is no standard to measure the soundness of the principle applied. No one knows how to assess the benefits or where they apply. Any other standard should be adopted with great caution and for a very limited period.

The only other course is by local and State aid. This shifts the burden, but does not diminish it. Instead of paying the fare on the car it is paid in taxes, in rent and

> the cost of living. But in the period of readjustment we may have to apply extraordinary remedies.
>
> The information even to state the problem accurately is not at hand. It is therefore recommended that there be at once a survey of the street railway situation by experts to report the amount of deficiency in revenue, the amount of taxes and other public charges paid, and what, if any, part of the deficiency should be met by remission of taxes and other public charges, and by appropriations of money, coupled with public control, by the localities and the Commonwealth in order to keep necessary transportation facilities in operation. Knowing the requirements and the resources, it ought not to be difficult to make them balance.
>
> The question of the policy toward public utilities should be taken out of politics. No greater harm can be done the public than by an attempt to make the operation of these agencies, which ought to be purely a matter of business, a means of partisan advantage. Unless this is done there can be no hope of reaching a proper solution.

SPECIAL INVESTIGATION COMMISSION SUGGESTED

Governor Holcomb of Connecticut regards the electric railway situation as very serious and recommends that a special commission be appointed to consider the matter and report at the present session. He said in part:

> The electric railway situation in Connecticut is such as to require serious consideration. Our whole industrial fabric is in a measure dependent upon our electric railway systems and it is of the utmost importance to the future welfare and development of our State that their operation should be efficient and their facilities ample. The report of the Public Utilities Commission just rendered shows that practically all the street railway companies are operating at a loss, which if continued long enough must result in dissolution, loss of investment and suspension of service. The commission in its report states:
>
>> There are numerous contributing causes for present street railway conditions, some inherent, some temporary, and some apparently permanent. Among the principal may be mentioned general war conditions involving high cost and difficulty of procuring material and supplies; high and constantly increasing cost of labor, and difficulty on account of the advantages afforded by private and governmentally controlled industrial enterprises of securing sufficient and competent help; the increasing burden of taxation; the municipal and statutory requirements of laying and maintaining street pavement; the loss of patronage naturally incident to the use of privately owned automobiles; and the more or less unrestricted competition of public service automobiles or "jitneys" so-called, operating at the option of the owner in the most profitable sections of the street railway company's chartered territory, during favorable weather conditions and on improved highways.
>
> The report further states:
>
>> It is the opinion of this commission that the best interests of the State require and will continue to require electric street railway service as an essential transportation agency, but if both of these competing transportation agencies are to survive and render proper service, some protecting legislation should be enacted whereby the necessary burdens would be more equitably apportioned and competitive rights more definitely limited.
>
> Under the street railway transportation system in Connecticut, the indirect taxation for street pavement in certain localities creates a burden upon other localities not thus favored, and requires the companies to construct and maintain a right of way not only for themselves but for competing transportation agencies which are not at present required to contribute their proportionate share toward the maintenance of such rights of way. The jitney or public service automobile, carrying passengers for hire, is in every sense of the word a public utility and as such should as in the case of all other similar agencies, be brought under the regulation of the Public Utilities Commission, and the traveling public should be protected in the matter of accident or damage from irresponsible common carriers and in the service they render. This whole electric railway situation is so serious and it is a matter involving to so great an extent the general welfare of our people, that it seems to me to be advisable for your honorable body to appoint forthwith a special commission to take it under consideration and to report at this session.

A misprint occurred in the heading of the first column of the table published on page 59 of last week's issue. The heading of this column, which showed a total of 991, should have read "number of companies" instead of "number of cars." The accompanying text showed that companies were intended.

Women in Steam Railroad Service

Increase of 40,000 in Number of Women Employed by Railroads in Ten Months—All Fields of Service Covered

IN JANUARY, 1918, the number of women employed by steam railroads in the United Stated was 60,000. By July it had increased to 81,000, and by Oct. 1 to approximately 100,000. These figures were presented on Dec. 6 before the labor reconstruction conference of the Academy of Political Science at Columbia University, New York City. The speaker was Pauline Goldmark, manager women's service section United States Railroad Administration.

Of the 81,000 employed on July 1, 61,000 were working as clerks of all kinds, stenographers, accountants, comptometer operators, etc. In this class appear women ticket sellers and bureau of information clerks, who served the public for the first time. The next largest group of 4000 comprised cleaners. Women had long been cleaning stations, offices, etc., but 800 were also employed in the yards to clean coaches and Pullman cars, both inside and outside, and in the roundhouses to wipe locomotives. In personal service, including work in dining rooms and kitchens, as matrons and janitresses, 2000 were found. In the railroad shops, women entered the greatest variety of new occupations. Three thousand were employed, ranging from common laborers to skilled machanics earning the machinist's or carman's rate of pay. The policy of equal pay to men and women for equal work has been followed by the United States Railroad Administration.

The skilled steam railroad operations in which women have become proficient, according to Miss Goldmark, are as follows: They are operating a number of machines such as bolt threaders, nut tappers, drill presses, for which no great skill or experience is needed, but they are also employed for highly skilled work. A number have succeeded as electric welders and oxy-acetylene burners. They have been found well adapted for work on the air-brake equipment and are cleaning, testing and making minor repairs on triple valves. In some places they are now working in a separate group on the lighter weight valves, weighing not more than 40 pounds. Women are found now performing the duties of crane operators and hammer operators in the shops, of turntable operators in the roundhouses and of packers of the journal boxes in the yards. They are acting as attendants in tool rooms and storehouses, and they are doing block signal work and acting as lever women in the signal towers.

In the post war period, while there is federal control of the railroads, Miss Goldmark states, the women will retain their own seniority rights, including the privileges of promotion. The railroads will of course recognize the seniority rights of all their employees returning from military service, but as far as the new employees are concerned, women will have the same privileges as other new employees in retaining their positions or being assigned to other jobs. The present indications, however, are that they will remain as a permanent part of the great army of clerical workers, rather than in the out-of-door occupations and in the shops and roundhouses where the environment is oftener unavoidably unsuitable.

More Terminal Loops

New Plan Relieves Congestion in San Francisco—Approximately 290 Cars an Hour During Rush Periods Pass Over Loop

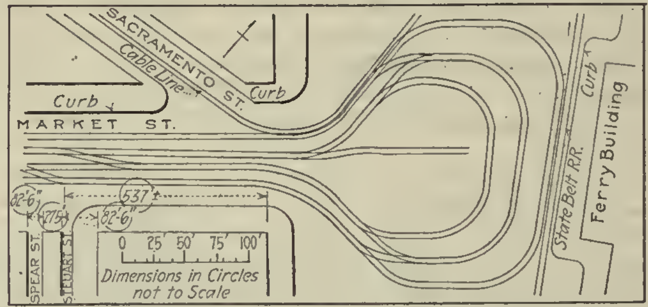
THE ferry loop at the foot of Market Street in San Francisco has been the limiting factor in the rush-hour traffic for some time. When the municipal lines began sending cars to the ferry on the new outer tracks on Market Street, the loops had to handle an additional forty cars per hour. This at once produced serious congestion. In the rush hours cars were blocked for five to eight squares from the loops, and the system could not serve the commuters who had to catch boats. Then the loop arrangement was changed and the change has been so effective that the limiting factor in the system has been shifted to another point, that is, cars can now be loaded and moved out of the loops faster than they can move along Market Street.

The changes made at the loop provided for three tracks instead of two, the new arrangement being as shown in the accompanying drawing. The inner loop remains as it was, the middle loop is a new track and the outer loop is the original outer loop moved over closer to the Belt Line Railway. Operation of the steam line is not frequent enough to interfere seriously with the street cars. Sixteen cars can now stand on the three loops as compared to nine, which was the limit of the old double loop. With sixteen cars on the loops there is still space for 8-ft. and 12-ft. traffic lanes between the standing cars so that access to the inner loops is provided.

During the morning and evening rush hours about 290 cars per hour now pass around the loops, 110 on the inner track, eighty on the middle track and 100 on the outer track. This is no faster than the rate at which the old loops were handling cars, but now the increased standing capacity on the loops makes it possible for cars to remain there long enough to afford ample time for loading. Meantime the vehicular traffic along the Embarcadero crosses the neck of the loops. When this is stopped a number of loaded cars are ready to leave the loops promptly as an equal number of cars enter.

LOOPS HAVE RESERVE CAPACITY

The capacity of the loops could be increased 20 per cent over the figures above given, it is believed, were it not for the fact that the cars cannot be operated out of Market Street away from the ferry any faster than they are now being put around the loops. That is, with 152 cars per hour going out on the outer Market Street tracks, there is a headway of only twenty-six and one quarter seconds. This is not sufficient to allow passengers to get through to the inner tracks and as passengers cannot safely stand between moving cars on the inner and outer tracks, the outbound cars are blocked while the inner cars are loading. At present 137 cars per hour move from the loops onto the inner track and 153 onto the outer track. The congestion on the outbound tracks, while not so serious as that formerly obtaining at the loops, delays cars so that at Sansome Street, where the first United Railroads cars turn off, they are seven to twelve minutes late during the rush-hour periods.



PLAN OF TRACKS AT FOOT OF MARKET STREET

THERE ARE NOW THREE LOOPS IN FRONT OF THE MARKET STREET FERRY

Simplifying the Automatic Substation Wiring Diagram

ONE of the most recent automatic substations to be commissioned is the Warrenville substation of the Aurora, Elgin & Chicago Railroad, of which E. S. Gillette is electrical engineer and S. E. Johnson is superintendent of substations and lines. This substation contains a number of ingenious devices but the present note is intended primarily to call attention to a simplified form of circuit diagram of its wiring which has just been developed by the substation and line department. In its usual form this kind of diagram is decipherable only to the expert, but it is desirable if possible to have a diagram in which the circuits can be traced out by an intelligent maintainer. The A. E. & C. diagram developed for this purpose is reproduced herewith.

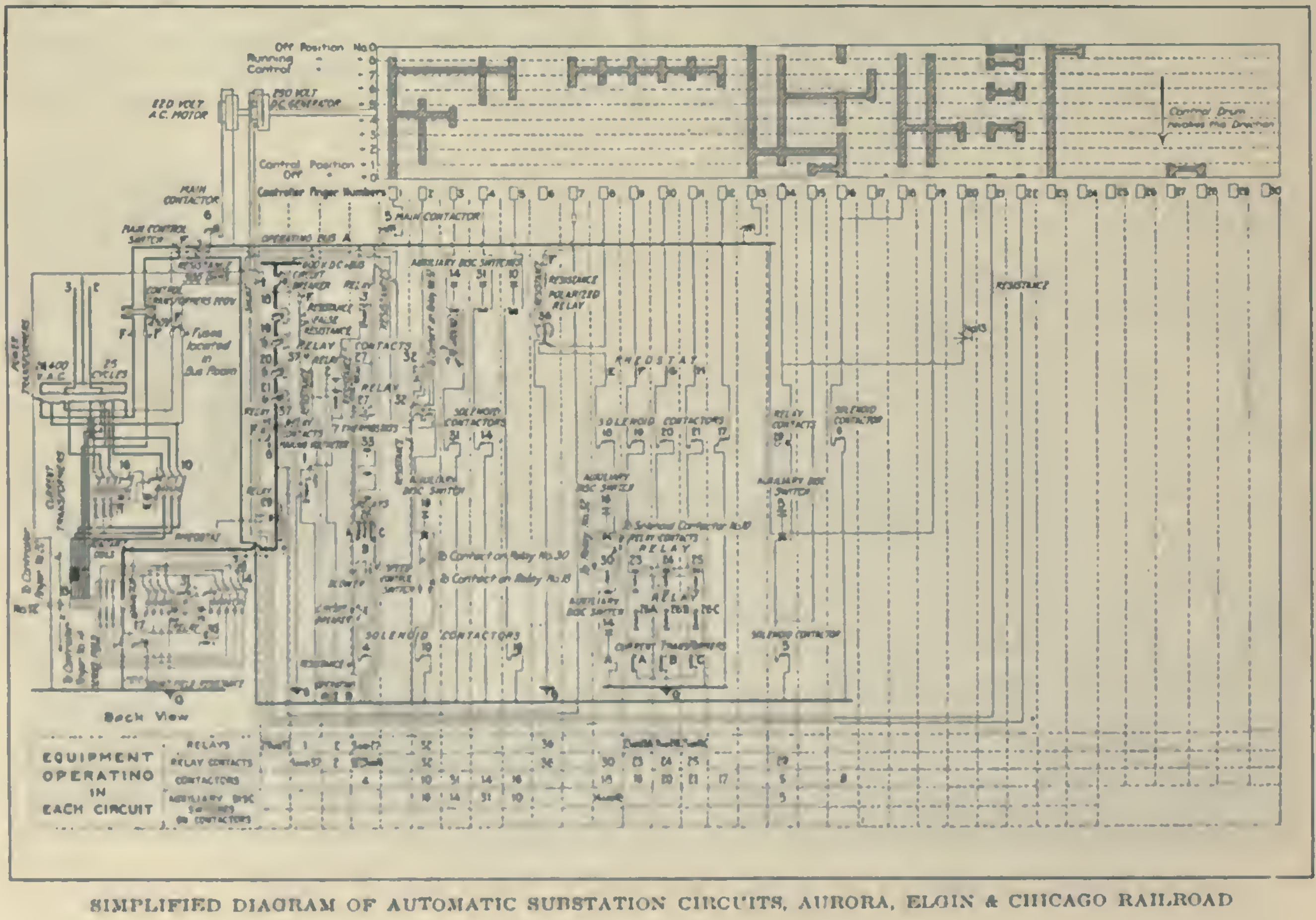
In this diagram the controller is developed and stretched out across the top of the drawing, with the contact fingers and segments plainly indicated and numbered. The main power apparatus is set off at the left, all power wires being indicated by heavy lines. The control apparatus and circuits are laid out as nearly as possible vertically in line with the controller fingers so as to facilitate the use of the diagram. To this end the same relay or contactor will ordinarily be shown in two places, one in the control circuit and the other in the power circuit. Each piece of equipment is labelled as well as numbered. The standard numbering of the apparatus is used, however, so that anyone at all familiar with substation diagrams will feel perfectly at home with this one.

At the bottom of the chart is a table showing graphically as well as by numbers the pieces of apparatus in circuit when each controller finger is engaged with a segment. This permits almost instant checking because the finger numbers are given directly below the controller fingers. To aid the eye and prevent error light vertical lines are drawn between fingers. The original diagram also contain an auxiliary table, omitted in the cut for simplicity, showing the relay settings. This table is as follows:

RELAY SETTINGS FOR AUTOMATIC SUBSTATION

Relay Number	Time Setting	Current Setting D.C. in Amperes at 600 Volts	Current Setting A.C. in Amperes at 430 volt-seconds	Remarks
37	......	Close at 150 amp.	....	Under load relay.
36	......	Close at 300 volts D.C.	....	Open on wrong polarity.
32	......	....	....	Close at 190 volts. Open at 180 volts.
30	......	Close at 2 amp. Open at 0.78 amp.	....	....
29	......	Open at 50 amp. reverse	....	Reverse power relay.
27	......	....	....	Close at 190 volts. Open at 180 volts.
26	......	....	....	Overload inverse T.L.
25	12 sec.	....	1400	Opens instantaneously.
24	10 sec.	....	1500	Opens instantaneously.
23	8 sec.	....	1600	Opens instantaneously.
3	5 min.	....	....	....
2	Instantaneous	....	....	Opens on short circuit.
1	3 sec.	....	....	Close at 500 volts D.C.

An excellent diagram in the usual form was given in connection with W. C. Slade's article in the issue of this paper for Dec. 14, 1918, page 1040. It will be of interest from comparison with the simplified diagram.



SIMPLIFIED DIAGRAM OF AUTOMATIC SUBSTATION CIRCUITS, AURORA, ELGIN & CHICAGO RAILROAD

Exterminating Ground Squirrels on the Pacific Electric Railway

BY CLIFFORD A. ELLIOTT

Cost Engineer Maintenance of Way Department, Pacific Electric Railway, Los Angeles, Cal.

THIS company has experienced considerable trouble with the ground squirrel pest, which imposed a difficult maintenance problem upon the way department. Climatic conditions in southern California favor the breeding of these squirrels in large numbers. The rodents burrow into the banks of cuts along the right of way and also honeycomb the roadbed. The resulting porous condition of the ground is the cause of softening of roadbeds and cuts. The most damage is done during the rainy season, when storm waters enter the openings, loosen the cuts and cause landslides. The depredation of the squirrels in the embankments of bridges is also extensive. These pests infest some localities quite extensively and considerable trouble is experienced in wiping out their villages. The constant undermining of the tracks by them soon results in a general deterioration of the roadbed. During the spring months the rodents leave the company's right-of-way, going into adjoining fields to destroy the growing crops.

"GASSING" OUT RODENTS ON PACIFIC ELECTRIC RAILWAY

At left, typical infested right-of-way; in middle, group of men "gassing" out squirrels; at right, device used in producing destructive vapor.

The damage to the crops on abutting farms each year is very great, and the farmers complain continually of the pests which inhabit the company's right-of-way. The company each year co-operates with the farmers in carrying on a campaign to eliminate them, and additional aid is given by the State Horticultural Commission.

Attempts have been made to exterminate the squirrels by putting out poison-soaked hulled barley. This has done some good, but during the spring season the plan is of no avail as the ripe, juicy roots of growing grain in the fields are more appetizing, and the rodents refuse to eat the barley that has been scattered near their burrows.

The company has recently found in the market an automatic distillate vapor machine for gassing the squirrels in true war-time fashion, and the use of this device has gained excellent results. The squirrels are gassed in their burrows, as well as other small animals, such as rabbits, badgers, snakes, owls, etc., which unfortunately inhabit the same holes as the squirrels.

Regular engine distillate is used in the machine, which produces a white vapor. The gas when generated is forced into the burrows, effort being made to have the wind in the operator's favor so that the gas may be forced deeper into the burrows. Adjacent holes are carefully watched for the vapor to appear and these are then tamped up at least 1 ft. deep by the operator's assistants. The vapor displaces the air in the holes and effectively disposes of the rodents. Usually when the large chamber, or main burrow, is gassed six to eight other outlets for the escaping vapor are discovered and these are immediately closed in order to get the desired results. The gas is not ignited when discharged into the burrows, the vapor alone accomplishing its object. When the complete gassing process has been efficiently undertaken, the burrows are refilled with vapor and the hole in which the gas discharge pipe has been operating is then closed.

Upon entering a cut to gas, one foreman and four assistants are engaged. Two men with a gas machine work on one side of the cut, while two more with a second machine work on the opposite side. The best time to gas is after a rain, when the holes have been opened up by the water. One foreman and four men will average eighty main burrows in a ten-hour day, the two machines consuming 3 gal. of distillate during this period.

Electric Railway Section, N. S. C., Inaugurates Monthly News Letter

The first of a series of monthly news letters signed by H. B. Adams, chairman electric railway section National Safety Council, has been sent to the 131 company members of the section. This letter contains an article on "Efficiency and Accident Prevention," and it also raises a number of points of interest to electric railways generally.

Among other things, the executive committee of the Safety Council desires to know if there is considerable demand for special electric railway safety films for moving picture machines, and to what extent electric railways have produced such films or arranged with outside firms to have them produced. Mr. Adams sets as a standard for the nine months before the next Safety Congress a reduction of one accident per mile of track represented in the membership. As the present members operate 14,542 miles the standard is thus placed at 15,000 accidents, or at the rate of 20,000 per year.

LETTER TO THE EDITORS

Cinders for Ballast Should Receive More Consideration

UNION TRACTION COMPANY OF INDIANA
ANDERSON, IND., Jan. 7, 1919.

To the Editors:

In the JOURNAL for Dec. 21, 1918, R. C. Cram set forth very clearly the necessity for using ballast in sufficient quantity and of proper quality. As stated by the author, ballast is the foundation that transmits the load from the track structure to the subgrade. The character of the foundation depends on the amount of load on the track structure, eliminating, of course, unusual conditions in the subgrade.

For electric interurban railway tracks other than those located in paved streets, having axle loads up to 37,500 lb., the writer believes that cinders should not be placed so far down the list of desirable materials as Mr. Cram places them. Cinders can be worked at lower temperatures than most other ballast materials, especially bank run gravel, and they can be worked after heavy rains in wet weather. Cinders also retard the growth of vegetation.

It may be that cinders produced from some kinds of coal, when used as ballast, will decrease the life of ties, but the writer's experience with this material for eight years, as produced by the power plants of the Union Traction Company of Indiana, is that cinders do not in any way decrease the life of ties.

Cinders should not come in contact with the rails, especially where track circuits for automatic signals are used, as there probably will be greater leakage of return currents through cinder ballast than through any other kind of material used. Leakage of electric current should not be a criterion, however, in the use of cinders, as all ballast material should be kept from contact with the rails. When ballast is up to the top of the ties at the rails, small particles will work between the rails and the ties and increase the mechanical wear of the tie by breaking down the wood fibers.

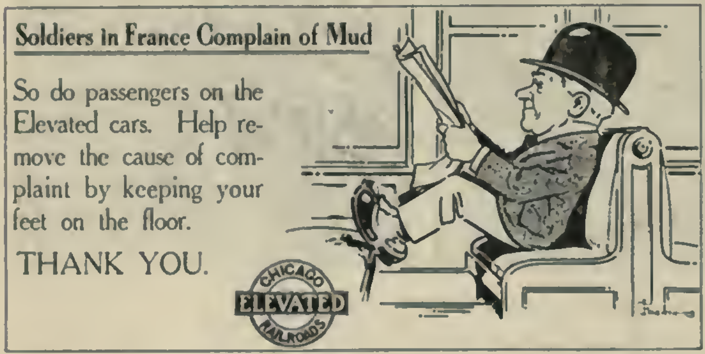
Cinders are a by-product of steam generating power plants and should not be wasted unless the financial condition of the railway will permit. They cost nothing as ballast. Any other kind of ballast material must be purchased, and then in addition there is the usual expenditure for loading, hauling and placing. Cinders must be loaded, hauled to destination and placed, but then they are on hand and some disposition must be made of them.

Concerning the track-center distance where more than one track is used, the best practice for permanent main-line structures, such as poles, platforms and bridge support is a minimum distance of 7½ ft. from the center of the track. Center-pole line construction will require a track-center distance of 16 ft. assuming that the diameter of the pole is 1 ft. at the point of minimum clearance from the car body.

L. A. MITCHELL,
Engineer of Maintenance of Way.

Putting Ideas Across in Chicago

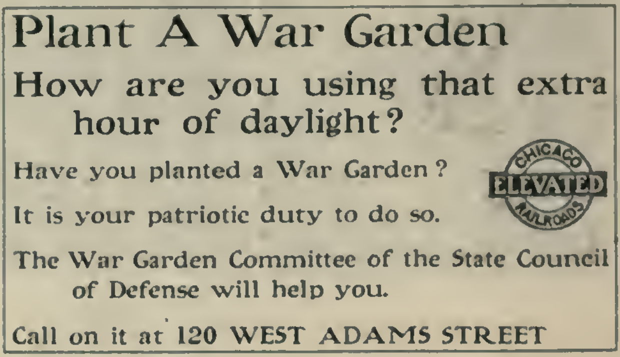
THE car posters reproduced herewith constitute part of a series of eight which were recently used by the Chicago (Ill.) Elevated Railways. The first appeared about July 1. The posters, which measure 18 in. x 10-in., are glued onto the windows in a conspicuous location. The title of each poster and the "Thank You" are always printed in red, and in some cases also the company insignia.



Soldiers in France Complain of Mud

So do passengers on the Elevated cars. Help remove the cause of complaint by keeping your feet on the floor.

THANK YOU.



Plant A War Garden

How are you using that extra hour of daylight?

Have you planted a War Garden?

It is your patriotic duty to do so.

The War Garden Committee of the State Council of Defense will help you.

Call on it at 120 WEST ADAMS STREET

CHICAGO
ELEVATED
RAILROADS

EXAMPLES OF POSTERS USED BY THE CHICAGO ELEVATED RAILWAYS TO LAY ITS PROBLEMS BEFORE THE PUBLIC

The posters have brought forth some letters of suggestion from the public and have been mentioned in the local papers. They will be continued and will be used to present some of the serious problems confronting the company.

Future Electrification in Great Britain

In his presidential address before the Institution of Civil Engineers of Great Britain Sir John A. Aspinall had considerable to say with regard to electrification of steam railroads. "It has been remarkable," said he, "how when each suburban line has been worked by electrical trains with great frequency and increased rapidity there has been a very great growth of passenger traffic.

The probable course of events will be that we shall find that electrification of the lines immediately around our great towns will quickly take place all over the country, but it is not until these widening circles begin to touch one another that we shall see electrical energy used for long-distance passenger trains. The additional revenue required to pay interest on the large capital outlay can be made most rapidly from the suburban traffic in well-selected districts."

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

Buffalo Talks Purchase

International Railway Willing to Relinquish Control If Guaranteed 8 Per Cent on Valuation

After the return of Mayor George S. Buck and the other members of the City Council of Buffalo, N. Y., from Cleveland, E. G. Connette, president of the International Railway, sent a communication to the Mayor setting forth that the railway wants the city to control its service and is ready to relinquish operation in the city if the city guarantees a return of 8 per cent on the valuation of the property.

DRAFTING TENTATIVE AGREEMENT

After the receipt of this communication from Mr. Connette, the Council directed the Corporation Counsel to confer with the traction officials and draft a tentative agreement so that the Council will have a concrete plan before it upon which to work. The city law department is now preparing this tentative agreement. It is expected that the City Council will demand only a 6 per cent return.

In his communication to the City Council, Mr. Connette called attention to the fact that the owners of the property were desirous of reaching an agreement with the city and pointed out that certain bases set down by the Mayor are acceptable to the company if taken together. Mr. Connette added:

"I am prepared and authorized to agree to any method by which the fair valuation of our Buffalo property can be determined within the rules laid down by the courts to govern a valuation for rate-making purposes. The public service commissioners for this State have quite generally allowed 8 per cent as a fair return on the capital valuation. We regard this as low, but with proper guarantees in the shape of reserves, maintained either by the city or by the right to raise the fare, if necessary, we would accept 8 per cent. I do not think it would be profitable to enter upon any effort to estimate the needed improvements.

COMPANY NEEDS MORE REVENUE

"I think that Buffalo has a very fair equipment. What we need most is money to pay the increased cost of operating the equipment which we have. The public's good-will has been against us for so long that I fear that we do not receive credit even for our good intentions."

The Mayor says it would be desirable in some way to substitute two mortgages for the present liens, one covering the lines within the city of Buffalo and the second covering all properties outside the city.

The Public Service Commission has denied the petition of the railway for the commission to receive its answer to the rate complaint filed with the commission several years ago when the city thought there was a reasonable prospect of getting the 5-cent fare reduced. The right of the commission to hear the case was questioned by the company and court proceedings were brought to enjoin the commission from hearing the case. The company contended that its franchise from the city protected its right to charge a 5-cent fare. Some time ago the city made application to withdraw its complaint from the commission and the company made an application asking the commission to receive its answer. It is said that the company by a certiorari or mandamus proceeding may try to compel the commission to receive its answer and go on with the rate case. The question of jurisdiction is still to be tested.

Rapid Transit Can Proceed

The Court of Appeals at Cincinnati, Ohio, has affirmed the decision of the Common Pleas Court in refusing an injunction against the Rapid Transit Commission to prevent it from issuing $80,000 of bonds for the purpose of paying for the preliminary surveys for the proposed rapid transit loop and other necessary work to be done in preparing for its construction.

While the Common Pleas Court held that the commission was not bound by its resolution not to spend any of the money provided in the authorized $6,000,000 bond issue until the plan of operation is definitely determined and approved, the higher court goes further and says this declaration is analogous to those contained in political platforms and for a similar purpose. Moreover, the court holds that the resolution was not a contract and that the commission is clearly unable to bind its own hands in this matter and thus disable itself from exercising its discretion in proceeding with further preliminary work that might become necessary to the direction of the enterprise. It cannot divest itself of the incidental and necessary right to spend money for such purposes.

Attorney John C. Rogers brought the suit as a taxpayer, alleging that the commission adopted a resolution before the bond issue was voted upon, to spend none of the money until the plans for the loop had all been completed and approved.

Brooklyn Outlook

Receiver Friendly to Press but Not Over-communicative—Wants Facts First

Lindley M. Garrison, receiver of the Brooklyn (N. Y.) Rapid Transit Company, after two hours' interview with Federal Judge Mayer on Jan. 3, when asked as to the future of the road, said:

"Until I have an opportunity to make a survey of the physical and financial properties of the company, I shall be unable to make any statement in regard to definite plans."

PHYSICAL SURVEY LIKELY

In a formal statement issued later, the receiver said in part:

"We desire to operate this property with the greatest attention to the safety of the traveling public that is possible, and I propose to set about at once ascertaining the information that can be obtained on this subject and putting into practice whatever will give the greatest assurance of safety to the traveling public.

"I propose obtaining from the Public Service Commission, a physical survey of the property, if the members have already made one, and if not, propose requesting them to do so, so that I may benefit by any observations or suggestions resulting from the facts developed.

"In respect to damages accruing to the individuals, on the occasion of the recent lamentable accident, I, of course, cannot at present give any assurance, because I do not know the financial resources of the company available for the purpose, but I can say that it is the intention of the court and the receiver to do everything humanly possible to see that funds are available to pay all just claims.

FACTS NECESSARY TO DECISIONS

"With respect to the matter of increased income in order to maintain the roads at a proper standard of efficiency and give the best possible service, I cannot at this time usefully make any statement, as I am not advised of the facts. I propose to set about immediately acquiring all available information under this head, so as to be able to inform the court and carry out whatever policy is adopted by the court.

"In respect to the questions that have been mooted in regard to the subsidiary companies, and what will be done in respect of them, I have no information and shall have to acquire the same before I can have any views or make any recommendations, or aid the court in carrying out any policy."

Chicago Electrification Proposed

Terminal Plan Divided into Stages with Time Limit to Be Fixed Before Ordinance Is Passed

A new ordinance, drafted by the Railway Terminal Commission of Chicago, has been submitted to the City Council as a basis for further dealing with the railroads on the subject of electrification. The ordinance covers the erection by the Illinois Central Railroad of a new passenger terminal at East Twelfth Street, and the railroad is ordered to proceed to rearrange and relocate its tracks, stations and appurtenances on its main line in the city so as to make them suitable for operation by electric power in accordance with time limits to be decided upon before the ordinance is passed.

MICHIGAN CENTRAL INCLUDED

The Michigan Central Railroad, which also uses the East Twelfth Street station, is at the same time ordered to arrange to operate its trains and cars by electric power from Kensington Station north to the Chicago River.

Electrification of the Illinois Central Railroad is to be put into effect in four different stages, but the time limits for each have not yet been decided upon. Stages of development are as follows:

1. The entire suburban passenger service within the city limits.
2. Freight service on all tracks north of East Twelfth Street.
3. Freight service on the main line south of Twelfth Street to the city limits and over the South Chicago Railroad, the Blue Island Railroad and the Kensington & Eastern Railroad.
4. All remaining freight service and through passenger service within the city limits.

Electrification of the Michigan Central Railroad will take place in two stages as follows:

1. Freight service on all tracks north of East Twelfth Street.
2. All remaining freight and passenger service north of Kensington Station.

SUBURBAN SERVICE AFFECTED

Other railroads not operating by electricity will be permitted to enter the city over the Illinois Central tracks for the interchange of freight and the Illinois Central Railroad will be permitted to handle similar exchange business by steam.

The ordinance contains provision for suburban service underneath Grant Park in connection with the development of plans for subways for street and rapid transit railways. Authorization is also given to change from time to time the type of construction or operation and to extend systems of distribution for power, light and water along the right-of-way of the companies affected.

The attitude of the Railway Terminal Commission has been that a railroad can be electrified when it can be shown that it is financially practical. For this reason it was considered advisable not to institute an ordinance covering the electrification of all steam lines, but to separate them, and provide for the electrification of each as financial conditions warranted. The large suburban service of the Illinois Central Railroad naturally made that line the first to receive attention.

An ordinance was submitted by the Illinois Central Railroad more than a year ago which provided only for the electrification of its suburban service. This was not acceptable to the city, and thus the new ordinance is the next step in the development. Public hearings have been and will continue to be held on this ordinance, and as a result of these the dates for the completion of the various stages of the work will be decided upon. It is believed that these will be periods of approximately five-year intervals.

AGITATION STARTED IN 1915

Numerous items concerning the development of plans for electrification at Chicago have appeared in the ELECTRIC RAILWAY JOURNAL during the last three years, beginning with the smoke abatement report which appeared late in 1915. As the present ordinance is concurred in in practically every detail by the railroads affected, it is believed that it will be passed without difficulty, and that work on the electrification will start without delay.

M. O. Bill Ready in New York

A bill which is favored by the State Conference of Mayors, permitting each city in the State of New York to purchase and operate every public utility within the city limits, has been drafted and perfected and will be introduced in the Legislature soon, according to present plans. Governor Smith also favors such legislation. One provision of the Mayors' conference bill avoids the debt limit prohibition by permitting a city to issue public utility securities which would not be included in computations of a city's debt limit. This is now the rule concerning New York City subway bonds and water and dock bonds. Where a city's debt limit does not interfere, a city may issue the usual obligations of a municipality to purchase public utilities.

Travis H. Whitney, of the Public Service Commission for the First District of New York, was one of the committee which drew the bill favored by the Mayors' conference. The measure provides that a municipality shall not commence the acquisition or establish or begin the operation of a public utility without first securing the consent of the Public Service Commission, and all municipal public service corporations would be under the jurisdiction of the public service commissions, the same as when they were under private control.

Each city is to create a municipal director of public utilities with power to appoint and remove employees, who would have the power to provide adequate and continuous service at reasonable rates without undue discrimination.

Another provision would permit several municipalities or political divisions of the State to organize into a single utility district and jointly acquire and operate public utilities.

Terminal Approved

Cleveland Votes for Union Station Facing the Public Square—For Steam and Electric Passengers

The franchise giving the Cleveland Union Terminals Company a right to erect a union station facing the Public Square at Cleveland, Ohio, was approved by a vote of the electors on Jan. 6, by a majority of 10,842. The plan includes both steam and interurban passenger station service, to the exclusion of the lake front proposition which was intended to take care of the steam roads only.

O. P. Van Sweringen, president of the company, stated that construction will probably be begun in March. Approval of the Federal Railroad Administration will be sought at once. Funds for the construction are said to be ready. Within a few days a meeting of the heads of the railroads which will use the station will be called to complete details.

Besides occupying all the space facing one-fourth of the Public Square on the south from the new Hotel Cleveland, also a Van Sweringen proposition, to Ontario Street, the west side of the latter street will be improved with new structures. In addition, the same interests are building a freight terminal and a system of warehouses where all freight will be delivered and received at high-level for the roads which enter the basement section of the terminals from the river valley, thus saving cartage up and down the steep hills to the depots where they are now located.

A portion of a rapid transit line reaching Cleveland Heights and Euclid Heights, now becoming an extensive residence district, has been built. This will be completed to the new depot. Rapid transit service will also be furnished to other suburban districts.

MR. ARNOLD REPORTS ON PLAN

Bion J. Arnold, who has been investigating the transportation problem of Cleveland for the Chamber of Commerce, made a report to that body on Dec. 17, in which he stated that the location of a union station on the Public Square would eventually cause such great congestion that another station would have to be built. The growth of the city has been such, he said, that it will double its normal operations in about eight years. All business statistics prove this.

The proposed trackage for the entrance of steam roads to the Public Square site might be adequate for fifteen years, but should much new commuter service be introduced, another depot might easily have to be built within that time. Electrification would appear essential for a depot in that location. Mr. Arnold advises against the abandonment of the suburban depots, as they accommodate people on the crosstown lines and will aid in the development of steam commuter service.

Location of the station on the Public Square is advantageous because of convenience of access, but there are many objections to it in other ways. Considering the expense of building track entrances of interurbans to the station and the readjustment of operations required in other ways, Mr. Arnold doubts the feasibility of the plan mapped out for them. On the original plan of building a station on the lake front, which is recommended for further consideration, a separate station for the use of interurbans would have to be built, as outlined in the original plan, shown in the Cleveland & Youngstown Railway ordinance.

Omaha Labor Case Settled

Joint Chairmen William H. Taft and Basil M. Manly of the National War Labor Board held a hearing in Omaha, Neb., on Jan. 2 and 3 in connection with grievances charged by the carmen against the Omaha & Council Bluffs Street Railway.

A decision read by Mr. Taft at the close of the hearing directs that the railway shall make some changes in schedules in the interest of fairness and justice to the men. It was held that the company acted within its rights, under the rules of the War Labor Board, when it refused on Dec. 3 to enter into a contract with the union.

Messrs. Taft and Manly held, however, that the pride of union men and the technical sensitiveness of the company led to controversies. Union recognition was not a vital factor of the hearing, although the decision, in effect, read that sometimes too much stress has been placed by the company on the question of whether a committee of its employees represented a union.

In the matter of alleged discrimination against union men by the company, the decision held that the company is endeavoring to comply with the orders of the War Labor Board. The application for a modification of the award in the matters of increased wages and a fundamental change of schedules was overruled, because a hearing may be had before the entire War Labor Board on Feb. 1, when a revision of the award will be considered.

The matters in dispute went before the board for settlement following a short strike.

Kansas City Service Nearly Normal

Company Looks Upon Strike as Ended — Peculiar Angles of a Peculiar Controversy

The Kansas City (Mo.) Railways resumed service on Dec. 13, two days after the strike started. By Jan. 1 half the normal number of cars were in service, and cars were running as late as 9 o'clock at night. On Jan. 4 owl car service was restored on the important lines, marking the turning point in the resumption to normal service.

The court proceedings which have assisted the restoration of service have been diverse, because of the different conditions in Kansas City, Kan., and Kansas City, Mo.

The company had filed in both Judge Van Valkenburgh's court, Missouri side, and in Judge Pollock's court, Kansas side, its suit to get light on the War Labor Board's decision of Oct. 24, and for injunction against hindrance in raising fares. On Dec. 2, the courts en banc, rendered their decision, the company appealing to the Supreme Court of the United States. Meanwhile, the company had instituted its petitions to the State Public Service Commissions, to secure authority to increase fares as the War Labor Board had recommended.

The employees struck on Dec. 11.

On Dec. 17 the company sought leave to file suits for injunction against the strikers and others, in both federal courts. These suits for injunctions were supplemental bills to the suit regarding the War Labor Board's decision. Judge Van Valkenburgh, in the Missouri district, granted a restraining order. Hearing as to an injunction was set for Dec. 27; postponed from time to time. The defendants had emphasized the question of jurisdiction; and had attacked the filing of the petition as a supplemental bill. On Jan. 4 Clyde Taylor, attorney for the company, filed, as attorney for the Continental & Commercial Trust & Savings Bank of Chicago, an Illinois corporation, an original bill, asking injunction; this proceeding seeming to meet all possible objections as to jurisdiction and as to supplemental bills. in the matter. Hearing of this application was set also for Jan. 11.

On the Missouri side of the state line, the city police had promised protection to property, and were trying to give it; the company had also the protection of the Missouri National Guard.

The course of events on the Kansas side was somewhat different. Judge Pollock denied an injunction, but he ordered the railway to restore service; ordered the city officials to provide protection, and retained jurisdiction. On Jan. 2 the Kansas City (Kan.) Chamber of Commerce was allowed to intervene, with a showing that the railway had not complied with the order to restore service, and that the city had not provided guards. The court thereupon ordered the marshal to enforce its orders that cars should run and protection be provided; and granted, at this time, the restraining order asked on Dec. 17 by the company. The marshal, advised of the prospective order, had many deputies ready; he swore in others, and also gave commissions and stars to motormen and conductors operating cars in Kansas. The marshal reported daily to the court in regard to the enforcement of the court's orders.

Meanwhile, the strikers appeared before the War Labor Board in Omaha, and were instructed to present evidence of their allegation that the company was not in good faith seeking to secure higher fares that higher wages might be paid. The War Board suggested that they would appear to better advantage if they returned to work; the company, however, definitely declined to restore their contract, or take them back except individually as the merits of each of the applications warranted.

Following the refusal of the War Labor Board on Jan. 3 at Omaha, to reopen the Kansas City case, E. M. Harber, city counselor of Kansas City, Mo., sent a telegram on the strike situation to the board. Mr. Harber stated emphatically that charges were unfounded that the company was not doing its best to secure higher fares. Mr. Harber, however, asked the board to restate its findings, to remove all possible misunderstanding.

President Kealy issued a statement on Jan. 5, after hearing of the proposal the strikers were about to make as to returning to work. This statement he concluded as follows:

Too Late for Former Conditions

> It is too late for anyone to talk of returning under former conditions and restoring the status quo. This might have been possible during the first few days before hundreds of new men were employed and before the company had given its word to those hired. Lapse of time and acts of violence have foreclosed the rights of any former employee of this company who has broken a contract and put this community to loss and inconvenience, now to come back and demand to be returned to his former status. This is a physical impossibility. We have more than 1,400 men in train service and are adding to these at the rate of 100 a day. Complete restoration of normal service now only waits upon the instruction of students.
>
> A number of our ex-employees are taking advantage of this and have returned to work to-day. Many more have made their arrangements to do so to-morrow. In view of the fact that we have practically rebuilt our organization, all those wishing to return to the work for which they are trained should do so without any delay. Every day means that more places are filled, and if they continue to wait a larger number of them cannot be used.
>
> For the benefit of the business and civic interests of the two Kansas Cities, we are insistent upon a termination of this matter in such a way as to insure an uninterrupted continuation of railway service in the community. The necessity for this has been clearly shown by the fact that there have been three strikes in a period of sixteen months.
>
> For the first time in three years we are now able to rebuild our organization to the size it was before the war.

New York City Conferences

Explanation Made of Negotiations with City Looking Toward Settlement of Transit Matters

Theodore P. Shonts, president of the Interborough Rapid Transit Company, New York, N. Y., appeared before the Public Service Commission for the First District on Jan. 7 and corroborated the testimony given by James L. Quakenbusch, general attorney for the company. Mr. Quakenbusch testified on Jan. 6 before the commission that he and Grenville McFarlane, a Boston lawyer, who is said to have been associated with William Randolph Hearst in the promotion of public ownership legislation, had had several conferences with Mayor Hylan over the matter of increased fares for the Interborough.

RAILWAY OFFICERS CONFER WITH MAYOR

Mr. Shonts said that he personally had called upon the Mayor and suggested that the city be represented on the Interborough board of directors. Mr. Shonts is quoted as follows:

"Mayor Hylan told me that there must be some solution of the fare problem. I suggested that a committee from the roads and the Board of Estimate get together and try in some way to thresh the whole thing out. Mayor Hylan said he did not know but that it would be a good thing."

During the present inquiry there has been much talk about a "protocol" drawn following conferences between the railway and city officials whereby the city would assume control of all the transit lines. In its original form this document provided that, as the city and the Public Service Commission would not consent to an increase in fare unless the companies agreed to convey their railroads and assign the leases of those they did not own, trustees be appointed by the public authorities to manage the lines so as to furnish the best possible service and to protect the investors.

EIGHT-CENT FARE SUGGESTED

It further provided that the fare should be increased to 8 cents, with 3 cents additional for transfers; that all of the profits should be deposited with a trust company, and that the profits, if there be any, should be divided between the city and the companies. It is also provided that the Legislature be petitioned for an amendment to the Constitution, so that the city could make a trust agreement similar to that between the city of Boston and the Boston Elevated Railroad. Other necessary laws, to enable the carrying out of the plan, were also to be sought, so that all the lines could be operated as a unified system after the Chicago plan.

It was also provided that the Interborough and the Brooklyn Rapid Transit Companies receive their preferentials from the city as a guaranteed payment. The plan provided that the city should transfer to the trustees any accumulated funds out of its one-half part of the sum in excess of the minimum returns above the cost of service, and that if this sum did not amount to sums set forth in tables to be known as "Guaranty Fund Tables," the trustees must make up the difference out of the funds in their possession after paying the costs. If the fund was not then full the plan provided for payments by the city to complete the amount necessary. The cost of service was to cover these items:

All operating expenses, including damages and maintenance, repairs, and renewals.

Taxes.

Rentals and interest on all funded debt.

Such allowance for depreciation of property and for obsolescence and losses in respect to property sold, destroyed, or abandoned property, as the trustees may deem necessary or advisable, or prior to their appointment as may be agreed upon, or fixed by arbitration.

All other expenditures and charges which, under the laws of the State of New York, now or hereafter in effect, may be properly chargeable against income or surplus.

The city and the Public Service Commission were to have the right to appoint two directors.

On Jan. 7 Mr. Shonts referred to the feeling between the Mayor and the commission, and said that he represented a client that was, figuratively speaking, between two fires, and that the conferences were conducted so that an agreement could be reached with the Mayor, and then submitted to the commission on its merits. Mr. Shonts said that Mr. Quakenbusch's explanation was quite correct.

Mr. Cameron Exonerated

Cases against employees of the United Railways, St. Louis, Mo., including Bruce Cameron, superintendent of transportation, hastily indicted in July last for their alleged connection with the disappearance of the referendum petitions calling for a vote on the new franchise for the railway, since refused by the company as too onerous in its terms, have been dismissed in court for lack of evidence. When the case was called recently, attorneys for the railway announced their readiness to proceed, but no one appeared to prosecute for the city.

In proclaiming his innocence at the time the indictments were returned Mr. Cameron said:

"I have been indicted upon the evidence of one Jackson, who confesses he committed the deed himself, and of which I am innocent and had no knowledge or connection. My case will be tried in court, where my innocence will be established."

Carhouse and Cars Destroyed

The carhouse and twelve cars, belonging to the Southwestern Gas & Electric Company, Texarkana, Tex.-Ark., were destroyed by fire on Dec. 27, causing a loss of more than $100,000. The company operates 14 miles of electric railway.

Council Approves Purchase

Seattle Body Votes to Take Over Local Railway—Friendly Suit to Fix City's Purchase Right

The City Council of Seattle, Wash., on Dec. 31, passed, by a vote of five to two, the ordinance authorizing the city to purchase the railway property of the Puget Sound Traction, Light & Power Company, for $15,000,000 in utility bonds. The ordinance was passed after negotiation lasting over a period of four months.

DATE OF DELIVERY UNCERTAIN

While the exact date for the delivery of the properties cannot be set, A. W. Leonard, president of the company, states that unless unexpected obstacles arise, the transaction ought to be closed in forty-five to sixty days.

To determine the legality of the transaction, and to interpret the meaning of the utility bonds, the City Council and traction officials agreed to file a "friendly" case in the King County Superior Court. Papers in an injunction suit restraining the city from issuing bonds had been prepared, and the case was filed immediately after the ordinance was passed.

By the terms of the purchase ordinance, the company is required within forty-five days after the termination of any litigation in connection with the transaction to deliver the property to the city free and clear of all incumbrances. All franchises are to be surrendered to the city and the company is to dismiss all legal actions pending against the city. All taxes are to be paid up to the date of the transfer, including the gross earnings tax for 1918. The company is required to pay a forfeit of $400 a day, for every day after the forty-five days following the termination of the litigation, which transpires before the deed to the property and the bill of sale are delivered.

The ordinance also provides that the company must replace any property destroyed by fire or otherwise pending delivery to the city. When delivery is made, the company will be required to submit a statement showing that from Oct. 1 last up to the time of delivery, there has been spent monthly on maintenance the same average monthly sum that was spent for that purpose during the last five years. If this sum is not spent on maintenance, the company will be required to turn the cash over to the city. Until all of the above conditions are fulfilled, the city will retain the $15,000,000 in utility bonds.

MORE THAN 200 MILES INVOLVED

The property to be acquired by the city includes 203 miles of track, 540 cars, carhouses and yards, repair shops at Georgetown, cable stations and all equipment and supplies required in the operation of the railway system. The railway is said to comprise only about one-fifth of the Puget Sound Traction, Light & Power Company's properties in the Seattle district. Company headquarters will be continued in Seattle, with A. W. Leonard president, at the head.

Councilman Oliver T. Erickson, the father of municipal ownership in Seattle, voted against the purchase, on the ground that the price was too high.

It has been reported that a referendum would be invoked on the railway purchase, but city officials do not expect any such development in view of the fact that at the time the advisory ballot was submitted in November the people voted four to one in favor of the purchase.

Omaha Ready to Sell

The appointment of a committee of three to include the Mayor is being urged upon the Council of Omaha, Neb., to confer with the officers of the Omaha & Council Bluffs Street Railway, Omaha, Neb., with respect to the matter of the possible purchase of the property by the city. The company's position on the matter has been stated through G. W. Wattles, its president. He is quoted as follows:

"I will be very glad to talk to the committee appointed by the City Council. I have stated openly to the Council that we are willing to sell the street railway. But there are two sides to that proposition. If the city wants to pay us the money we have put into the development of this property to its high standard of the present day, plus the legal rate of interest on that money, then we won't lose much time in agreeing and I shall advise the stockholders to sell. But if, on the other hand, the city is going to try to take away from the stockholders of this company the property which their money and their efforts and their foresight have developed, if they are going to try to take this property away without a just compensation to those who have put their money into it, then we shall have a great deal to say."

News Notes

Municipal Ownership Bee Buzzing.—The City Council of Columbus, Ohio, on Dec. 30 asked City Attorney Scarlett for an opinion on the legal and financial measures necessary to acquire the railway property of the Columbus Railway, Power & Light Company. This is regarded as a first step toward municipal ownership, but is really incidental to the franchise and fare dispute between the company and the city.

City Wants Leased Lines Abolished.—One of the first measures presented after the new City Council at Providence, R. I., had organized provides that the Council committee on Rhode Island Company affairs be directed to prepare a plan and present it to the General Assembly abolishing the leased line system, reducing the capital stock and eliminating unprofitable lines. The resolution calling for these changes has been referred to the committee for consideration.

Accepts Wisconsin Indeterminate Permits.—At the instigation of President A. M. Robertson, the Duluth-Superior Street Railway has surrendered its franchise to operate in Superior, Wis. The system operating between the two cities is now on the indeterminate permit basis so far as Wisconsin is concerned. Difference in the terms of the permit and franchise is mainly based on the appearance before the State instead of city officials for any grants to be made in behalf of the company or public.

Hudson Tunnel Bill Rejected.—The Senate interstate commerce committee voted on Dec. 12 its disapproval of the Calder bill, providing for an appropriation by the government of $6,000,000 to build a vehicular tunnel under the Hudson River at New York. A decision not to report the bill to the Senate was reached after the committee had heard representatives of the Joint Tunnel Commission of New York and New Jersey and other advocates of the tunnel scheme. The project was rejected on the ground that Congress would be setting a precedent for tunnel and bridge enterprises, backed by government capital.

Question of Contract Rights in New Jersey.—The report of the committee of the New Jersey League of Municipalities to decide whether the United States Supreme Court will pass upon the power of the Board of Public Utility Commissioners of New Jersey to abrogate municipal franchise contracts providing for maximum rates for utility service, will be submitted at a meeting to be held in Trenton, N. J., on Jan. 20. The question has been referred to the executive committee of the league. If the matter goes to the United States Supreme Court, it is said that the test will be made in connection with the decision of the State Commission authorizing the Public Service Railway to raise its fares.

Moving Platform Plan Presented.—The Continuous Transit Securities Company, of which M. Everhart Smith is president, has filed with the Public Service Commission for the First District of New York a plan for the establishment of a moving platform in Forty-second Street in place of the present shuttle subway operation between the East and West Side subway lines. It is proposed to utilize two of the four tracks and to construct three moving platforms, the fastest of which will operate at a speed of 9 m.p.h. and its seating capacity 31,600 passengers an hour. The cost is estimated at less than $1,000,000. The commission has taken the plan under consideration.

Berkeley Preparing for Blanket Franchise.—As the first step toward granting a resettlement franchise to the San Francisco-Oakland Terminal Railways, the City Council of Berkeley, Cal., has requested the State Railroad Commission to place a valuation on all properties owned by the company in Berkeley. A revaluation as requested by the Council will be placed on holdings of the company as they existed on March 2, 1917, which is the date of the first request made by the railway for a blanket franchise. Under the proposed betterment franchise the company will operate under a single permit instead of a multitude of franchises covering various units of the system.

Brooklyn Officials Ask Change of Venue.—The attorneys for President Timothy S. Williams, of the Brooklyn (N. Y.) Rapid Transit Company, and other officers of the company indicted in connection with the accident on Nov. 1, have secured an order directing the District Attorney to show cause why a change of venue to a county outside of New York City should not be granted. The order is returnable before Justice Callaghan in Special Term of the Supreme Court, Part I, on Jan. 16. Justice Kapper was to have tried the first of the cases on Jan. 6, but the order of Justice Jenks acts as a stay, and no trial can be had until Jan. 30, at the earliest. The stay remains in operation until three days after the court makes a decision on the argument for the change of venue.

Programs of Meetings

New England Street Railway Club

The New England Street Railway Club will hold its annual Manufacturers' Night on Jan. 23, at the Hotel Somerset, Boston, Mass. A large committee is making unusual preparations for the dinner, entertainment, music and vaudeville.

Illinois Electric Railway Association

The annual meeting of the Illinois Electric Railway Association will be held at the Hotel La Salle, Chicago, Ill., on Jan. 17. It is expected that P. H. Gadsden, chairman of the committee on readjustment of the American Electric Railway Association, will address the meeting. There will also be an address on safety by H. B. Adams, chairman of the electric railway section of the National Safety Council. John Leisenring of the Illinois Traction System, H. A. Johnson of the Chicago Elevated Railways, B. J. Fallon of the Chicago Elevated Railways and W. P. Potter of the Illinois Traction System, chairmen of the electrical, mechanical, way and traffic committees respectively will each present a paper. The allegory "The Grim Reaper," which was presented before the Central Electric Railway Association at Indianapolis in November, will be presented at Chicago.

Financial and Corporate

More Revenues Needed

New York Railways in Latest Fiscal Year Lacked $153,000 of Meeting First Mortgage Bond Interest

During the year ended June 30, 1918, the income of the New York (N. Y.) Railways was $153,634 less than the sum required to pay its operating expenses, rentals and interest on its first mortgage bonds. In other words, it lacked by this amount sufficient to pay the interest on its first real estate and refunding 4 per cent bonds and paid no interest whatever on its $30,609,487 of 5 per cent adjustment bonds. Naturally the stock, which under the reorganization was reduced from $52,000,000 to $17,500,000, received nothing. The company has no surplus to draw upon to make good these losses. In fact, it had an existing deficit at June 30, 1918, of $1,355,880.

The result, the company's annual report states, is inevitable. Reserves have been depleted, and available funds from all other sources are being used up in an endeavor to maintain the service until an increased fare can be had. Unless this is speedily forthcoming a receivership cannot be avoided, with its attendant losses and probable disruption of service, as under a receivership a large portion of the service now rendered by the company at a loss would be discontinued.

Since strikes on the lines of the system were in effect within the first half of the fiscal year ended June 30, 1917, which created abnormal results both as to revenue and expenses, extended comparison between 1917 and 1918 revenues and expenses would be useless. The following comment, therefore, while setting forth the amount of the increases and decreases as between 1918 and 1917, is confined generally to a comparison between the year ended June 30, 1918, a year free from strikes but within the war period, and the year ended June 30, 1914, a period prior to the war.

The gross passenger revenue for the year ended June 30, 1918, showed an increase over that of the preceding year of $419,518 or 3.75 per cent. As compared with 1914, the revenue from passengers during 1918 fell off $1,806,433 or 13.46 per cent. There was also a decrease approximately corresponding thereto in the number of revenue passengers carried, there having been 34,849,794 less passengers carried in 1918 than in 1914. Other street railway operating revenue increased $6,406 over 1917, and as compared with 1914 decreased $104,021.

Railway operating expenses during the last year were $8,131,471, an increase over 1917 of $262,661 or 3.34 per cent.

The total charge to the maintenance accounts during 1918 (equal to 20 per cent of the total operating revenue) was $2,384,007, an increase of $85,175 as compared with 1917. The total expenditures for maintenance during the year were $2,822,916, or $438,909 in excess of the charge, thus reducing the company's reserve for maintenance and depreciation. During 1914 the actual expenditures for maintenance were $2,447,395, and there was credited to the depreciation reserve account $324,773, the total charge for maintenance and depreciation being $2,772,168.

COMPARATIVE INCOME STATEMENT OF NEW YORK RAILWAYS FOR YEARS ENDED JUNE 30, 1917 AND 1918

	1918		1917	
	Amount	Per Cent	Amount	Per Cent
Revenue from transportation...	$11,615,247	97.45	$11,195,729	97.40
Other railway operating revenue...	304,786	2.55	298,380	2.60
Total revenue from railway operations	$11,920,033	100.00	$11,494,109	1000.00
Operating expenses:				
Maintenance of way and structures......	$1,368,433	11.48	$1,249,171	10.87
Maintenance of equipment.....	1,454,483	12.20	910,467	7.92
Horsepower—revenue car service	908	0.01	53,151	0.46
Operation of power plant	675,366	5.66	608,615	5.30
Operation of cars	3,593,811	30.15	3,526,824	30.68
Injuries to persons and property	1,157,154	9.71	1,051,400	9.15
General and miscellaneous	641,495	5.38	597,697	5.20
Total "actual" expenditures	$8,891,650	74.59	$7,997,325	69.58
Maintenance of way and structures, reserve	$33,186	0.28	$99,768	0.87
Maintenance of equipment, reserve	472,095	*3.96	39,416	0.34
Injuries to persons and property, reserve	321,240	*2.69	267,699	*2.33
Total reserves.....	$760,179	*6.37	$128,515	1.12
Total operating expenditures and reserve credits	$8131,471	68.22	$7,868,810	68.46
Taxes assignable to railway operations	1,170,223	9.82	1,032,011	8.98
Total operating expenses and taxes...	9,301,694	78.04	$8,900,821	77.44
Income from railway operations	$2,618,339	21.96	$2,593,288	22.56
Non-operating income	627,118	5.27	647,600	5.64
Gross income........	$3,245,457	27.23	$3,240,888	28.20
Deductions from gross income..	2,676,550	22.45	2,666,052	23.20
Net income available for interest on 4 per cent bonds...	$568,907	4.78	$574,835	5.00
Interest on 4 per cent bonds	722,541	6.07	722,887	6.29
Net income before deducting interest on adjustment mortgage income bonds and other requirements	*$153,634	*1.29	*$148,052	*1.29
Add—surplus account	*1,202,246	*10.09	*996,679	*8,67
Surplus	*$1,355,880	*11.38	*$1,144,731	*9.69

*Decrease or deficit.

TRAFFIC STATISTICS OF N. Y. RAILWAYS

	1918	1917
Cash fares...............	223,765,819	215,672,697
Revenue transfers.... ..	14,377,030	13,866,986
Free transfers...........	83,891,488	85,088,109
Total passengers	322,034,337	314,627,792
Ratio of free transfer passengers to revenue passengers, (per cent).....	35.23	37.07
Average fare per passenger:		
Per passenger, including transfers (cents)....	3.607	3.559
Per revenue passenger (cents).....	4.877	4.877
Operating expenses per passenger:		
Per passenger including transfers (cents)	2.525	2.501
Per revenue passenger (cents)......	3.415	3.428
Car-miles....... ..	26,993,360	28,918,483

During 1918 the amount expended for injuries to persons and property was $1,157,154, an increase of $105,754 over 1917. The costs as accrued during the year, however (on the basis of 7.2 per cent of the gross passenger revenue), resulted in a net charge to operating expenses on this account for 1918 of $835,884, the difference between the amount expended and accrued representing the balance in the accumulated reserve account which was discontinued after June 30, 1918.

Taxes assignable to railway operations showed a rise of $138,212 or 13.39 per cent as compared with 1917. This increase is accounted for principally by additional federal income and excess profits taxes applying to leased lines, the burden of which will, it is anticipated, be relatively even greater during the coming year.

The gross income for 1918 was an increase of $4,569 over 1917. As compared with 1914, however, there was a decrease of $1,208,131. Income deductions during 1918 increased $10,150 over 1917, due principally to an increase in interest on bills payable, less decreases in charges on account of interest on other unfunded debt, and decreases in sundry rents, etc.

There was a deficit of $153,634 in net income for 1918, and the deficit at June 30, 1918, was $1,355,888, an increase as compared with 1917 of $211,148. A comparison of 1914 with 1918 shows that at June 30, 1914, the amount of surplus available for interest on adjustment mortgage income bonds and other requirements, was $1,196,164 or $2,552,044 more than on June 30, 1918.

Miscellaneous operating statistics of the company for the years ended June 30, 1917 and 1918, are shown in the table above.

Effect of Higher Fares

Revenue Increased and Riding Decreased in Most Cases—Interurban Traffic Suffered Less than Urban

In a recent canvass made by the information bureau of the American Electric Railway Association among electric railways which are collecting increased rates of fare, the replies indicated that the riding habit of the patrons of 53 per cent of the companies was adversely affected by the fare increases. On the other hand, 40 per cent of the companies found no alteration, and 7 per cent experienced an actual increase. This information was obtained from 161 companies with about 16,513 miles of single track. This is 34.12 per cent of the total mileage for the United States.

REVENUE DECREASED IN FEW CASES

In 81 per cent of the cases the operating revenue of the company was increased. In 10 per cent there was no increase, and in 9 per cent there was an actual decrease.

Of the purely urban companies, seventy-one of which reported, 58 per cent showed a decrease in riding, 36 per cent showed no adverse effect, and 6 per cent reported an increase. Seventy-eight per cent reported increased revenue, 10 per cent no change and 12 per cent actual losses.

Of the thirty-four purely interurban companies reporting, 29 per cent showed a loss in riders, 52 per cent no change and 19 per cent a gain. Eighty-six per cent reported increased revenues, 11 per cent no increase and 3 per cent a loss.

Of fifty-six companies doing both urban and interurban business, 61 per cent reported a decrease in riding, 37 per cent no change and 2 per cent an increase. Eighty-two per cent of the companies reported an increase in revenue, 13 per cent no change and 5 per cent a loss.

The accompanying table gives the ratio (expressed in per cent) between the actual percentage gain in revenues and the theoretical increase in revenue or percentage increase in fare. For instance, if a company secured a gain of 20 per cent in actual revenues from a 20 per cent increase in fare, its ratio would appear as 100 per cent. Less than the theoretical gains in revenue, therefore, are reflected by ratios of less than 100 per cent.

EIGHTY-FIVE COMPANIES REPORTED

The table represents the experiences of eighty-five companies reporting definite results of advances in fares. In the determination of the percentages, the cash fare was used as a basis, owing to the lack of definite figures on reduced rate tickets. The table, therefore, should not be used as a criterion for measuring very accurate results.

Fifty-two per cent of the companies, in their fare increase campaigns, used publicity in order to educate the people, either by newspaper advertisements or by company organs and leaflets distributed among the car patrons.

Of 100 companies stating whether or not valuations were required before the increases were permitted, thirty-seven replies were in the affirmative. Some stated that either the commission granting the increase had estimated the value or that questionnaires were submitted by the commission and answered by the companies. There were sixty-three negative replies.

One hundred companies answered as to the duration of the award. Fifty-nine of the companies received emergency awards, ranging from the duration of the war to certain specified periods after the signing of the treaty of peace. The other 41 per cent received permanent awards, several of them, however, being subject to further review by the commissions.

RATIOS BETWEEN PERCENTAGE INCREASES IN REVENUE AND PERCENTAGE INCREASES IN FARES IN 85 CASES OF REVENUE GAINED

Urban		Interurban	Urban and Interurban
1 to 19 Per Cent Increase in Fares			
Per Cent		Per Cent	Per Cent
86.6		19.2	29.4
100.0		29.4	57.5
100.1		42.0	
137.5		100.0	
20 to 49 Per Cent Increase in Fares			
10.6	60.0	17.5	22.5
24.3	60.0	21.0	22.5
24.5	60.0	33.3	30.0
25.0	64.0	40.0	31.7
27.0	64.3	40.5	37.5
32.0	64.8	60.0	50.0
36.0	67.5	60.0	50.2
36.5	70.0	67.6	63.2
37.5	75.0	83.3	71.5
37.5	75.2	112.0	75.0
37.5	83.3	120.0	80.0
40.0	84.0	135.0	90.0
41.0	90.0	147.1	91.0
50.0	94.0		100.0
50.0	100.0		100.0
50.0	100.0		107.0
50.0	100.0		110.0
50.0	100.0		150.0
50.7	100.1		
51.0	118.8		
50 to 100 Per Cent Increase in Fares			
20		10.6	50.0
		40.0	80.0

Mr. Tone Returns as Receiver

S. La Rue Tone, engineer, former president of the company and former Public Service Commissioner, was named, accepted and sworn in on Dec. 31 as receiver for the Pittsburgh (Pa.) Railways. Mr. Tone was president of the company when it went into the hands of receivers last spring. He was appointed to succeed J. D. Callery, resigned. It is the second time he has succeeded Mr. Callery in the affairs of the road, having been elected to the presidency when Mr. Callery resigned.

Charles A. Fagan and W. D. George, his fellow receivers, issued the following statement when informed of Mr. Tone's appointment:

"We are highly gratified with the appointment of Mr. Tone as one of the receivers. His standing as an engineer and his long experience as vice-president and then as president of the Pittsburgh Railways, coupled with his wide and comprehensive knowledge of public utility matters gained during his service as Public Service Commissioner of the Commonwealth, all render him eminently qualified to discharge his duties to the satisfaction of all."

Columbus Proxy Fight

Local Interests Assume Arbitrary Attitude Toward Management Interests Now in Control

The contest between the stockholders' protective committee and the Clark interests for control of the Columbus Railway, Power & Light Company, Columbus, Ohio, has centered in the selection of the proxy committee and each side has been contending for the balance of power in that respect.

At a metting of the directors of the company on Dec. 31, measures were taken to support the Clark Management Company and a proxy committee, consisting of F. R. Huntington, William C. Willard and E. R. Sharp was named. At least two of these men are residents of Columbus. They evidently do not see the necessity which is insisted upon by other Columbus interests of localizing the control and responsibility to the public.

This step forestalled the committee in its demand for three out of five members of the proxy committee, to which Clarence M. Clark, representing the management company, refused to yield. The committee, however, has selected three men as its proxy committee and it has been proposed that a joint committee of seven handle the proxies. The fight has thus centered about the selection of the seventh member, and up to Jan. 4 no agreement had been reached. The protective committee insists that it be allowed to name the seventh man and Mr. Clark and his associates were just as determined to name him themselves.

Mr. Clark, it is said does not expect to be a member of the committee, no matter what settlement may be arranged.

Several members of the committee, however, expressed the belief that an agreement would finally be reached and that it would not be necessary to canvass all the stockholders.

On Dec. 31 Mr. Clark issued a statement which in part reads in the following way:

> There is no desire on our part to control the board of directors or the management of the company. The only question at issue between me and the stockholders' protective committee this morning was as to the proxy committee of five. I at all times have been willing to agree on five names for such committee, all names to be satisfactory to both sides, or I agreed to have the stockholders' committee choose two, the board of directors two and these four to select the fifth member of the proxy committee.
>
> I also stated to the stockholders' committee that I would agree now on a board of directors, practically all of whom should be local men of standing, and on their selection such board could take such steps as desired in changing and creating the executive management of the company.
>
> The stockholders' committee would agree to nothing but the acceptance of its ultimatum—that on the proxy committee of five the committee must have three—Messrs. Kiesewetter, Kurtz and Massie. It was upon this issue alone that we agreed to disagree. There is really no issue between the purposes desired by the stockholders' committee and the interests all represent, in so far as the local management is concerned.
>
> The ultimatum of the stockholders' committee was presented to the directors of the company this afternoon and the directors concurred in my position in not consenting to the appointment of a minority of the proxy committee.

Vote Not Mandatory

Plymouth & Sandwich Company Loses Action to Compel Town Authorities to Subscribe for Stock

The full bench of the Supreme Court of Massachusetts has issued a decision in favor of the town of Plymouth in an action brought by the Plymouth & Sandwich Street Railway to compel the Selectmen to subscribe for 500 shares of stock in accordance with Chap. 95 Acts of 1911.

Town to Subscbibe to Stock

By this act the town was authorized to subscribe for the above shares at not more than par value ($50,000), to facilitate the construction of the road, and the town voted soon after the passage of the act that "the Selectmen . . . be and are hereby authorized in the name of and on behalf of the town to subscribe for . . . 500 shares . . . at a price not exceeding the par value thereof. Such subscription or purchase shall not be made by the Selectmen until they are satisfied that the balance of the amount necessary for the construction and equipment of said road is fully provided for."

In February, 1917, the railway made demand on the Selectmen for the purchase of 500 shares of its capital stock and on the refusal of the Selectmen a petition for mandamus was brought.

The court finds that on Jan. 1, 1917, the cost of construction and equipment of the road amounted to about $387,000, "with some thousands of dollars yet to be expended for necessary construction." Of the $387,000, $152,000 had been provided by the issue of capital stock; $217,000 by borrowing money on notes payable in one year after the money was borrowed (some of these notes were overdue), and for the balance of the $18,000 the company had run in debt.

The decision holds that by the true construction of the vote of the town the Selectmen were given permission to subscribe to the stock and that this is not an instance in which votes giving authority to do an act are to be construed to be votes directing that act to be done. Beyond this, says the finding, the authority or permission to subscribe was made conditional on the Selectmen being satisfied that the balance of the amount necessary for the construction and equipment of the road has been fully provided for; *i.e.* on the Selectmen being satisfied that the amount necessary for the construction and equipment of the road in addition to the $50,000 which would come to the company from the subscription of the town, had been fully provided for.

Selectmen Not Satisfied

A single justice found that the Selectmen in good faith, and after consideration of the situation, are not so satisfied, and the full bench upholds the previous finding. "In saying this," says the finding, "we have not overlooked the fact that the petitioner (the company) had no mortgage debt, that it planned to refund the construction notes by an issue of stock or other form of permanent security when the road had been completed and was in a position so to do, and the bankers for the petitioner agreed with the petitioner to effect a renewal of such said notes as were not exchanged at maturity for preferred stock, and at the meeting held on Feb. 1, 1917, between representatives of the petitioner and the Selectmen, the former agreed to accept the bonds of the town issued under the votes passed at the meeting of March 25, 1911, or to find purchasers for the same."

B. R. T. Receiver Will Raise $8,000,000

Lindley M. Garrison, receiver for the Brooklyn (N. Y.) Rapid Transit Company, on Jan. 7 outlined to an extent his financial plans for the immediate future of the property. In answer to a question as to whether the financial condition of the company at the present time was sound, he said:

"That depends on what you call sound. The company has enough money to pay its current operating expenses, the salaries of the motormen, conductors, etc. It has not enough money to complete its construction and equipment of new lines. About $8,000,000 is needed. Of this $3,500,000 will be required to obtain the necessary increase in motive power to operate the new type of cars which will be used when the new lines are in operation. It will be necessary to build additions to the existing power stations. The further sum of $4,500,000 will be needed to provide equipment such as rolling stock, wiring and finishing up certain construction work.

"I expect to apply to the court to obtain this amount of $8,000,000 through the necessary issuance of receiver's certificates to that amount. I will not, however, apply to the court until after Jan. 15 when the matter of making the receivership permanent comes before the court."

Interest Safeguarding Indianapolis

At a meeting of the directors of the Indianapolis Traction & Terminal Company, Indianapolis, Ind., held on Dec. 31, it was decided to pass the payment of $120,000 interest charges on the Indianapolis Street Railway general mortgage 4 per cent bonds, and also the payment of $60,000 to the sinking fund account, due on Jan. 1, 1919. According to statements of officials of the company, this step was taken to safeguard the interests of all concerned in the financial integrity of the company until a meeting of the security holders could be arranged. The semi-annual rental of $150,000 on the Indianapolis Street Railway was paid on Jan. 1 when due. These developments should all be viewed in the light of the emergency fare matter reviewed elsewhere in this issue.

New Buffalo Committee

Local Interests Promise Co-operation on Modification of Previous Deposit Agreement

While the members of the City Council of Buffalo, N. Y., are touring the country investigating the railway situation in the large cities, the situation in Buffalo as regards the International Railway is becoming more acute. The International Traction Company of New Jersey, which owns the stock of the International Railway, failed to pay, on Jan. 1, the interest on its $18,000,000 of collateral trust 4 per cent gold bonds. The interest was not paid because the International Railway has not declared a dividend since last March.

Previous Agreement Criticised

A second committee has been organized to protect the holders of these securities. Those on this committee are all Buffalo men. The Manufacturers & Traders' National Bank, Buffalo, has been designated as depository for the committee.

In a public announcement this committee says that the so-called protective committee organized on Dec. 10 fails to place any limit whatever on the expenses to be incurred by the committee for compensation of itself and legal counsel and also prevents a bondholder from withdrawing from the agreement after once having deposited his bonds unless 30 per cent of the holders of the deposited bonds file written objections to the plan adopted by that committee. Even then a bondholder can withdraw only by paying to the committee such amount as it may determine to be his proportionate share of its obligations and expenses incurred up to that time.

The new committee, of which H. T. Ramsdell is chairman, fixes the compensation to be paid to the members of the committee and its counsel at not more than 1 per cent of the face value of the deposited bonds. Any bondholder may withdraw from the agreement upon paying his proportionate share of any liability at that time incurred by the committee, provided that not more than 1 per cent of the face value of his bonds shall be charged for compensation and expenses of the committee. Mr. Ramsdell says that the main purpose of this committee is to co-operate with the so-called protective committee already formed, and to endeavor to obtain a modification of the agreement under which it is acting to conform with the above provisions. If this is accomplished the new committee will immediately deposit all of the bonds in its hands with the committee formed previously.

A 5-cent fare is still being charged in Buffalo. The company must weather the financial storm until after the special referendum election in March and there is every indication that the 6-cent fare proposition will again be defeated by the voters.

Financial News Notes

Goshen Suspension Vetoed.—The petition recently filed by the Chicago, South Bend & Northern Indiana Railway for permission to discontinue city service in Goshen and remove certain tracks has been denied by the Council of that city.

Receivership Hearing Put Off.—The hearing of the petition for receivership of the Montgomery Light & Traction Company, Montgomery, Ala., filed by the Commercial Bank and Savings Company, New Orleans, La., which was set for Dec. 20, was continued by Judge Henry D. Clayton of the United States District Court, with the consent of all parties. No definite date has been fixed for the hearing.

Evansville Foreclosure Sale on Jan. 18.—Judge Robert J. Tracewell, of the Vanderburg County Superior Court, has fixed Jan. 18 as the date of sale for the properties of the Evansville Railways. William A. Carson, who has been acting as receiver for the company, has been appointed master commissioner. The tentative plan for the purchase of the road by the bondholders and for its reorganization by them was reviewed in the ELECTRIC RAILWAY JOURNAL for Jan. 4, page 71.

Interurban to Be Sold.—The Columbus, Magnetic Springs & Northern Railway will be sold by the receiver, Charles J. Finger, at Delaware, Ohio, on Jan. 15. As noted in the ELECTRIC RAILWAY JOURNAL for Jan. 4, page 72, the Columbus, Delaware & Marion Electric Company has made a proposition to the residents of the town through which the line operates to assist in financing the road and keep it in operation if they meet certain conditions which are laid down.

Takes Advantage of Grace Period.—Holders of the 4½ per cent general mortgage bonds of the New Orleans Railway & Light Company, New Orleans, La., were recently notified in respect of the interest due on Jan. 1, on the bonds, that the company found it necessary because of abnormally high operating costs to avail itself of the days of grace as provided by the mortgage securing the bonds. It is confidently believed that interest will be paid within this period of grace.

Colorado Springs Default.—Default having occurred in the payment of the interest due on Jan. 1 on the first mortgage 5 per cent bonds of the Colorado Springs & Cripple Creek District Railway, Colorado Springs, Col., James Timpson, Robert Struthers, Jr., and Emerson W. Judd, owning or representing a substantial amount of the bonds, have consented to act as a committee to protect the interests of the bondholders. A protective agreement is in the course of preparation. Holders of the bonds are requested to notify the secretary of the committee, Mr. Judd, New York, of the amount of the bonds which they hold.

City Will Ask for Co-receiver.—The Board of Estimate of New York City on Jan. 3 decided to protect the city's investment in the dual subways by asking for the appointment of a co-receiver of the Brooklyn Rapid Transit Company, for which Lindley M. Garrison, ex-Secretary of War, was appointed temporary receiver. The motion to make the temporary receivership permanent will be heard by Judge Julius M. Mayer of the Federal District Court on Jan. 15, at which time the city of New York will be represented by the Corporation Counsel. It is probable, however, that a formal application for a co-receiver on behalf of the city will be made before that time.

Fresno Interurban Suspends Passenger Service.—The California Railroad Commission on Dec. 24 gave the owners of the Fresno Interurban Railway permission to discontinue street-car service in the city of Fresno on the ground that the traffic offered did not justify a continuance of operation. The commission found that every day the line was operated resulted in a heavy loss which the company was not able to stand. At the time suspension of passenger service originally came up, the commission ordered the installation of automobile service, but even this failed to pay. The company will, however, continue its freight service.

Receivership Suit Goes to Trial.—A motion by the United Railways, St. Louis, Mo., for dismissal of receivership proceedings brought against it by stockholders has been dismissed by Federal Judge Dyer in the District Court. This means the case will go to trial, probably at the March term of court. The court gave the railway until Jan. 20 to file an answer to the stockholders' bill of complaint. Suit for a receivership was filed on Jan. 7, 1918, by John W. Seaman, New York, a stockholder. On Jan. 31, 1918, the railway filed a motion for dismissal. This was sustained on Feb. 8, Judge Dyer ruling that the bill of complaint was defective. An amended bill was filed on July 13, and the railway again moved it be dismissed. It is this move for dismissal that has now been denied.

Communities Willing to Come to Terms.—The disposition of Bay State Street Railway representatives and remonstrants against the proposed discontinuance of non-paying lines of the road, to come to terms of agreement whereby the road will be enabled to continue operations through the present crisis in its affairs, has led Judge Morton in the United States District Court to terminate the hearing on the receiver's petition to discontinue the non-paying lines. S. H. Pillsbury, attorney for the receiver, suggested to Judge Morton that the decision on the petition be postponed indefinitely, as the majority of the district representatives had made arrangements with officials of the railway whereby their lines will continue to be operated, and that the other community representatives have indicated their desire to discuss similar terms.

Electric Railway Monthly Earnings

GALVESTON-HOUSTON ELECTRIC COMPANY, GALVESTON, TEX.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Oct., '18	$207,068	*$172,775	$34,293	$39,531	†$5,238
1m., Oct., '17	197,919	*126,614	71,305	38,403	32,902
12m., Oct., '18	2,599,424	*1,741,101	858,323	470,016	388,307
12m., Oct., '17	2,028,899	*1,349,087	679,812	447,661	232,151

HOUGHTON COUNTY TRACTION COMPANY, HOUGHTON, MICH.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Oct., '18	$21,060	*$18,725	$2,335	$5,026	†$2,691
1m., Oct., '17	26,023	*17,850	8,173	5,076	3,097
12m., Oct., '18	325,155	*219,455	105,700	60,282	45,418
12m., Oct., '17	341,821	*208,703	133,118	61,631	71,487

INTERBOROUGH RAPID TRANSIT COMPANY, NEW YORK, N. Y.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '18	$3,435,686	*$2,345,068	$1,090,618	$1,536,845	§‡$239,827
1m., Nov., '17	3,454,687	*1,900,069	1,554,618	1,097,265	§‡685,035
5m., Nov., '18	16,170,935	*11,440,439	4,730,496	7,230,483	§‡439,963
5m., Nov., '17	15,928,087	*9,018,680	6,909,407	5,380,053	§‡2,765,798

JACKSONVILLE (FLA.) TRACTION COMPANY

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Oct., '18	$73,973	*$72,515	$1,458	$16,892	†$15,434
1m., Oct., '17	59,743	*42,606	17,137	15,819	1,318
12m., Oct., '18	887,295	*649,781	237,514	196,759	40,755
12m., Oct., '17	678,268	*455,967	222,301	188,242	34,059

NORTHERN TEXAS ELECTRIC COMPANY, FORT WORTH, TEX.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Oct., '18	$200,632	*$147,242	$53,390	$28,172	‡$34,800
1m., Oct., '17	298,951	*142,029	156,922	29,148	‡137,357
12m., Oct., '18	3,028,815	*1,855,037	1,173,778	339,746	‡949,031
12m., Oct., '17	2,363,682	*1,346,955	1,016,727	349,354	‡676,956

PENSACOLA (FLA.) ELECTRIC COMPANY

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Oct., '18	$40,173	*$34,135	$6,038	$8,533	$2,495
1m., Oct., '17	25,807	*15,592	10,215	7,808	2,407
12m., Oct., '18	473,692	*320,377	153,315	97,739	55,576
12m., Oct., '17	331,242	*193,106	138,136	93,405	44,731

SAVANNAH (GA.) ELECTRIC COMPANY

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Oct., '18	$106,443	*$83,115	$23,328	$25,767	$2,439
1m., Oct., '17	88,589	*59,743	28,846	24,526	4,320
12m., Oct., '18	1,145,310	*788,949	356,361	300,375	55,986
12m., Oct., '17	942,348	*625,264	317,084	288,959	28,125

TAMPA (FLA.) ELECTRIC COMPANY

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Oct., '18	$82,785	*$48,241	$34,544	$5,087	$29,457
1m., Oct., '17	82,709	*46,814	35,895	5,501	30,394
12m., Oct., '18	1,034,114	*603,753	430,361	61,529	368,832
12m., Oct., '17	1,007,494	*557,897	449,597	54,532	935,067

* Includes taxes. † Deficit. ‡ Includes non-operating income. § Includes accruals under rapid transit contracts with city payable from future earnings.

Traffic and Transportation

Washington Wants More

Indications That Companies There Will Apply for More Than Present Five-Cent Fare

The Washington Railway & Electric Company and the Capital Traction Company, Washington, D. C., will probably ask for an increase in fares in the near future. This was intimated by railway officials at a public hearing conducted by the Public Utilities Commission of the District of Columbia to consider arguments for and against inter-company transfers.

COMPANIES WANT FULL HEARING

The hearing was a result of recommendations made by John A. Beeler, traffic expert in the employ of the commission, advocating inter-company transfers at certain points, affecting all car lines operating in Washington.

While the railway companies are opposed to some of the transfer points recommended, George E. Hamilton, president of the Capital Traction Company, stated that his company would not contest a full hearing. It is presumed that the other companies will assume the same attitude.

Mr. Hamilton stated that it was the belief of the officials of his company that the 5-cent cash fare which has been in effect was insufficient at present to produce the revenue necessary for a reasonable return to stockholders and bondholders. If it became evident that this was true, he said, the companies would expect the commission to increase revenues through whatever method was deemed best.

It was pointed out by John A. Hanna, vice-president of the same company, in charge of operations, that the operating revenues for December, under the straight 5-cent cash fare, had been less than the operating income for any month during the period from March, 1917, to August, 1918, inclusive. He said the general falling off in operating revenues was due in part to the influenza epidemic and in a measure to a decrease in population, following the cessation in war activities.

DISAGREE ON ESTIMATED LOSS

Aside from any monetary loss the companies might incur by reason of the proposed inter-company transfer points, which was estimated at approximately $30,000 in the Beeler report, but which railway officials state will reach to between $50,000 and $60,000 annually, Mr. Hanna pointed out that such a system would cause increased congestion at certain transfer points which are now troublesome problems and would also seriously overcrowd cars now running to capacity.

Railway officials stated that under the proposed inter-company transfer system the companies would be compelled to carry long-haul passengers at a loss and suggestions were made tending to introduce a new scale of fares which would increase the passenger fare on lines running to suburbs.

Latest Fare Tabulation

American Electric Railway Association Again Reports Fare Increases in Thirty-one Cities

The information bureau of the American Electric Railway Association announces fare increases in thirty-one more cities since its last report. The supplementary list now made public is as follows:

City	Population	Nature of Increase
Chicago, Ill. (el. lines)...	2,547,201	Five to 6 cents.
Boston, Mass..........	767,813	Seven to 8 cents.
Syracuse, N. Y..........	158,559	Five to 6 cents.
Grand Rapids, Mich....	132,861	Five to 6 cents.
Cambridge, Mass........	114,293	Seven to 8 cents.
Utica, N. Y.	89,272	Five to 6 cents.
Somerville, Mass.......	88,618	Seven to 8 cents.
York, Pa...............	51,770	Five to 7 cents.
Malden, Mass. (Bos. el.)	52,243	Seven to 8 cents.
Chelsea, Mass. (Bos. el.)	43,403	Seven to 8 cents.
Newtown, Mass........	44,345	Seven to 8 cents.
Dacatur, Ill............	41,483	Reduced rate tickets abolished
Charlotte, N. C.........	40,759	Five to 7 cents.
Everett, Mass..........	40,160	Seven to 8 cents
Brookline, Mass........	33,526	Seven to 8 cents
Medford, Mass..........	26,681	Seven to 8 cents
Walla Walla, Wash.....	26,067	Five to 8 cents.
Gloversville, N. Y......	22,314	Five to 6 cents.
Enid, Okla.............	21,356	Five to 6 cents.
Tucson, Aris...........	17,324	Five to 8 cents.
Glens Falls, N. Y.......	17,160	Five to 6 cents.
Ithaca, N. Y............	16,017	Six to 7 cents.
Long Branch, N. J.....	15,733	Five to 6 cents.
Watertown, Mass......	13,188	Seven to 8 cents.
Asbury Park, N. J......	14,629	Five to 6 cents.
Saratoga, N. Y.........	13,839	Five to 6 cents.
Helena, Mont...........	13,789	Five to 6 cents.
Morristown, N. J.......	13,410	Five to 6 cents.
Arlington, Mass........	13,073	Seven to 8 cents
Tiffin, Ohio..	12,962	Five to 7½ cents.
Tuscaloosa, Ala.	10,824	Five to 6 cents.
Johnstown, N. Y.......	10,678	Five to 6 cents.
Bowling Green, Ky.....	9,900	Five to 10 cents, (twelve tickets for $1.)
Ballston Spa, N. Y.....	4,138	Five to 6 cents.
Salisbury, N. C.........	7,133	Five to 7 cents, (four tickets for 25 cents.

A recapitulation of fare information for cities of more than 40,000 population has been made by the association. A summary of this information follows:

Fare Increases Granted	No. Cities
Six-cent unit zones, two zones, or more...... ...	1
Five-cent unit zones, two zones.........	3
Six-cent central zone, 2-cent suburban zone.....	9
Five-cent central zone, 2 cents outside zone....	2
Five-cent central zone, 3 cents a mile outside....	1
Eight-cent fares...	7
Seven-cent fares, plus 1 cent for transfer.........	11
Seven-cent fares.....	5
Six-cent fares.	44
Five-cent fare, plus 1 cent for transfer.....	4
Reduced rate tickets eliminated........	13
Fare Increase Applications Pending	
For 10-cent fare.	10
For 8-cent fare.	2
For 7-cent fare... ...	8
For 6-cent fare, one cent for transfer.... . .	1
For 6-cent fare..	23
For a charge for transfers......	2
For a zone system. ...	3
For general relief to be left to authorities	4
Note—This list includes fifteen cities in which one increase has already been granted.	
Cities negotiating for purchase of property .	2
Cities in which no action has been taken......	13
Cities in which relief has been refused	13

Four Cents a Mile

Road in Thinly Populated Farming Country Allowed Extraordinary Rate for Cash and Ticket Fares

The Public Service Commission for the Second District of New York on Dec. 31 passed an order fixing the maximum fare on the Southern New York Power & Railroad Corporation's lines, outside Oneonta, at 4 cents a mile for cash and ticket fares and 3½ cents per mile for mileage book rate. The commission's order says no changes are to be made in the present schedule of fares in force in Oneonta. The railroad operates from Mohawk to Oneonta, with a branch extending from Index to Cooperstown and a local system in Oneonta. The present fare rate is 3 cents a mile. The company alleged that this charge was insufficient to yield reasonable compensation for the services rendered.

It was shown that for the year ended Aug. 31, 1918, there remained of total receipts of the company, after paying operating expenses, taxes, rent of track and equipment, $66,457 out of which to pay fixed charges, depreciation and contingencies and any return on capital invested. The company has outstanding $952,000 of bonds and unfunded interest-bearing debt amounting to $122,725. Annual interest payable on this indebtedness amounts to between $50,000 and $55,000. Increases in pay dating from Sept. 1 will increase operating expenses by $15,000 per annum, not reflected in the above figures. It appeared probable that the company, provided the volume of its business and rates remained the same, would be in receipt of barely sufficient revenue to pay its operating expenses, taxes and fixed charges.

COMMISSION GUIDED BY COURT

Commissioner Cheney, who wrote the opinion in the case, said:

> We have hesitated before consenting to an increase of fare to 4 cents per mile, which is a higher rate than is charged for the carriage of passengers by any other road in the State except a few short lines operating under peculiar conditions. The reason of the hesitation is that we doubt the efficacy of the remedy for the ills this corporation is suffering and we fear that the loss of traffic will offset any benefit to be derived from the increase of fare. But the Court of Appeals has held that "the question what general policy should be adopted by the respondent in developing suburban trade was one to be decided by it and not by the State. The methods and rates which it should apply to the development of any policy were subject for regulation, but the question whether the welfare of the road would be best subserved by one policy or another was a subject to be decided by the officers and stockholders of the corporation."
>
> In view of that decision we are inclined to adopt the only method which appears to be available to enable this road to render service to the communities whose principal transportation facilities are afforded by it, and not assume to decide questions of policy in corporate management.
>
> We therefore find that the rates and charges of passenger service now charged by the Southern New York Power & Railway Corporation are insufficient to yield a reasonable compensation for the service rendered and are unjust and unreasonable and that the just and reasonable fares and charges for such service to be hereafter observed and in force by it as a maximum shall be at the rate of 4 cents per mile for tickets and cash fares and 3½ cents per mile for mileage books.

Interurban Advances

Indiana Board Approves Indianapolis & Cincinnati, Union Traction and T. H., I. & E. Petitions

Interurban passenger fares were increased to 2¾ cents a mile on the lines of the Indianapolis & Cincinnati Traction Company and the Union Traction Company of Indiana by orders issued on Dec. 31 by the Public Service Commission. The order in the case of the Terre Haute, Indianapolis & Eastern Traction Company, the third line asking for an increase over the present fare of 2½ cents a mile, was not handed down until Jan. 6.

NEW RATE EFFECTIVE JAN. 10

The increased rate was to take effect on Jan. 10 and the order is to remain operative until June 30, 1919. The rate of the Indianapolis & Cincinnati Traction Company was increased from 2 to 2½ cents a mile early last year and the rate of the Union Traction Company was increased from 2 to 2½ cents in June, 1918.

The commission takes the position in the orders that it is not primarily interested in the valuation of the interurban companies, but that its chief concern is to keep the electric system of transportation in operation.

The commission points out that the chief source of revenue for the interurban companies is the passenger fare. The order relates that interurban railways in Ohio and Illinois are now operating under a 3-cent rate, the same as is charged by the steam railroads. Whether the increased rate from 2½ to 2¾ cents will have a tendency to reduce the number of passengers and thereby defeat the purpose of the order, is considered by the commission in the order. It is noted that the various companies showed that there was a decrease in passenger traffic under the operation of the 2½-cent rate and that very little of the theoretical increase was realized.

INTERURBAN OUTLOOK NOT PROMISING

In summarizing the interurban situation in Indiana the order says:

"This railroad system, made up of several railroads, is easily one of the great assets of the State and its future, on an assumed basis of $30,000 to $32,000 a mile, is menaced by new conditions of which the most prominent are greatly increased costs of operation due to conditions growing out of the war, and the inroads of the auto passenger and truck cars. The signing of the European war armistice will tend to ease the situation somewhat, but it will probably increase the building of good roads and the number of automobiles—the 'natural enemies' of the interurban railroads of this character."

The order says that the commission did not accept the book value of the Terre Haute, Indianapolis & Eastern property submitted at the hearing of the case in December. This valuation was $26,050,558. "The prayer of the petitioner is justified on a basis of approximately half this sum," the order says.

Attention is called to the fact that the only remonstrance to the increase in rates by the Terre Haute, Indianapolis & Eastern Traction Company was made by the citizens of Ben Davis. The evidence showed that 90 per cent of the travel between Indianapolis and Ben Davis was on commutation tickets not affected by the basic mileage rate increase.

In the order of the Union Traction Company it is observed that the net operating revenue of this company under the operation of the 2½-cents fare in July, August and September, 1918, was $343,982 and in 1917 for the same period was $342,197. But in 1918 it is shown that the cost of maintenance of way and structures was 12.96 per cent greater than for the same period in 1917.

EMERGENCY RATES ONLY

The 2¾-cent rate is designated as an emergency rate in all three orders. It is to be computed upon the penny zone system and the minimum charge is to be 10 cents, except within the limits of incorporated cities and towns.

New York Opposed to Fare Increase

The attitude of the present city administration of New York toward the applications of the Interborough Rapid Transit Company and the New York Railways for increases in fares was announced at City Hall on Jan. 3 at the conclusion of a two-hour executive session of the board. The Interborough has petitioned for the right to charge 8 cents on the subway and "L," and the surface car lines 8 cents, with 3 cent transfers. Announcement of the Board of Estimate policy was made by Comptroller Craig, as spokesman for the Board. After some preliminary remarks the Comptroller said:

"We have determined not to consent to an increased fare to any private operator such as the Interborough. If the dual subway contract is modified at all it must be modified in other particulars so as to make the modification reciprocal and mutual."

"Are you impressed with the need of higher fares?" was asked.

"Temporarily," said Mr. Craig, "there is an occasion for a greater fare than conditions justified at the time the contracts were made."

This, however, applied only to the subways and elevated as operated under the dual subway contract and did not in any wise include reference to the surface situation.

"What if the lines were operated by the city?" was another question.

"Under the rapid transit act," answered the Comptroller, "municipally operated lines must be self-sustaining. Fares would have to be adjusted to meet the situation."

Higher Fare Warranted

Higher Wages and Fair Return for Milwaukee Must Come from Increased Fares

As the return on the investment of the Milwaukee companies is much below what can be regarded as a fair amount, the entire cost of any increase in wages should be met through increased rates. Such is the conclusion reached by Hagenah & Erickson as a result of an examination made for the employees' association of the Milwaukee Electric Railway & Light Company and the Milwaukee Light, Heat & Traction Company.

VALUATION CONSERVATIVE BASIS FOR RATES

In answer to specific questions asked by the association, the examiners found that the valuation of $47,564,162, adjusted to June 1, 1918, by the method followed by the Wisconsin Railroad Commission, presents an extremely conservative basis for rate adjustments, and that an annual allowance of 3 per cent of the depreciable property for depreciation is well within the range of what would be considered by any authority a fair amount.

In regard to what constitutes a fair rate of return, the report points out that this is ordinarily not less than 7.5 per cent of the fair value. Courts and commissions have generally held that a return of from 7.5 to 8 per cent is not only reasonable but necessary to attract capital. At present a return of 8 per cent is probably too low. In the past ten years, it is said, the Milwaukee companies' return has not been unreasonable. The estimated return for 1918 is 4.8 per cent. The railway system alone shows 3.84 per cent; the electric and heating system, just over 6 per cent. These returns are said to be too low for the best interests of the service.

WAGE INCREASE MUST BE MET BY FARE ADVANCE

Lastly, the report states that the adoption of the standard of wages recognized by the War Labor Board would mean an increase of $640,000 a year for railway employees and shop men and $265,000 a year for electric and heat department employees, a total of $905,000. On the point of electric railway wages Mr. Erickson says:

> The entire cost of any increase in wages in this department must come through increased fares, and we believe that such increase should be sufficient not only to cover the advance in wages to the National War Labor Board standard, if such action is contemplated, but that action should also be taken at such time to further increase the earnings of this department to the end that the net earnings, after such increase in wages, will yield a return more in accord with what public service commissions and courts have regarded as a fair return on a public utility investment.

The auditing committee of the employees' association, in recommending the adoption of the examiners' report, states that it has no suggestions to make regarding the rate of return except to point out that savings and loan stock secured and protected by rigid State laws earns in excess of 7 per cent. Continuing the committee says:

> Since the report was written, the Wisconsin Railroad Commission has increased electric rates. In addition to providing for increased cost of coal, materials and taxes, the commission has allowed 1.9 mills for wages in the electric and heating departments. This amounts to $350,000 per year. This increase in wages was made on the date the commission's order was delivered. The electric order made no provision for increased wages for electric railway employees. The $640,000 a year needed to bring the wage scales of such employees up to War Labor Board standards can be provided only through increased railway fares.

Features of Indianapolis Decision

Emergency Relief Granted Previously to Company Considered Sufficient in View of Downward Price Tendency

The ruling of the Public Service Commission of Indiana in the case of the Indianapolis Traction & Terminal Company declining to grant a further increase in fares on the Indianapolis city lines beyond the 5-cent fare established last October and abolishing the 1-cent charge for transfer, with rebate, all referred to briefly in this paper for Jan. 4, states that the emergency relief which has been granted the company in the increase to a straight 5-cent fare will continue in effect until 100 days after the final peace terms are signed and ratified by the United States.

SINKING FUND MONEY ALL EXPENDED

The commission finds that an emergency still exists, but believes that owing to a downward tendency in prices, the company will now secure relief from the excessive operating costs which have existed, and with voluntary action on the part of the company in reducing sinking fund and fixed charge accounts, sufficient revenue will be received to discharge all its obligations.

The commission suggests that a special meeting of stockholders and bondholders be arranged with a view to diverting the money collected in sinking funds to the immediate purchase of additional modern equipment. At the time of issuing the order the commission apparently was under the impression that amounts aggregating more than $2,000,000 which have been paid into sinking fund account were in cash, and the order was intended to provide for the use of these funds for improvements to the property.

This money, however, has been used to purchase bonds for the sinking fund, and these bonds have been canceled and the money is not available for the purchase of equipment, etc.

The commission also ordered the company to reorganize its transportation department as a possible means of bettering service, and suggested changes in the personnel of that department at least during the period of reorganization.

The order discusses at some length the financial structure of the company; its earnings during the sixty-day trial period of the 5-cent fare established in October, the result of which the commission believes was misleading owing to the existence of the "flu" ban during a part of that period; the reports filed by the company and the former public directors; the discrepancy between the report of the company's checkers and those of the commission as to the percentage of uncollected fares, which varied from 3 to 13 per cent, etc.

MR. MORGAN HOPEFUL

Marshall S. Morgan, Philadelphia, vice-president of the company, who has been in Indianapolis assisting in formulating steps to carry out the order of the commission, stated that the situation was very hopeful in that the commission in its order of Oct. 12 had placed a tentative valuation on the Indianapolis property of between $14,000,000 and $16,000,000, which the commission's engineer had stated was a low estimate.

Mr. Morgan stated that if the commission based its rate on this valuation and allowed 7 per cent for a just return on the investment and 3 per cent for depreciation, as had been done in the case of other Indiana utilities, the company would have sufficient funds to meet all fixed charges, obtain new capital and make improvements to the property. It was stated by officials of the company that the points suggested by the commission would be taken up in turn and every effort made to comply with the terms of the order. It was pointed out that very little time had been given the company between the date of the order, Dec. 28, and Jan. 1 when the payment of bond interest and dividends and the installment into sinking fund were due.

PREPAYMENT COLLECTION PROPOSED

The company is arranging for adapting all of its double-truck closed cars for prepayment fare collection.

New I. T. S. Interstate Tariff

New tariffs recently approved by the Interstate Commerce Commission allow the Illinois Traction System, Peoria, Ill., to charge the same rate of fare as that of the steam carriers. Previously the system has maintained 2 cents a mile fares, but a charge of 25 cents has been made for handling each piece of baggage.

Although the new interstate tariffs, which correspond with the intrastate rates now prevailing on the traction lines by order of the Federal Court, will be on the same basis as the steam carriers, it is stated that a differential in rate will still exist between points in Illinois and St. Louis in favor of the Traction System. This is because of the fact that, in preparing its interstate tariffs the Traction System has pursued its past policy of straight mileage fares into St. Louis and has made no special or arbitrary charge for transportation across the Mississippi River at St. Louis.

Free handling of baggage on the same basis as that prevailing on the government-operated steam railways is announced by the Illinois Traction System to take effect with the establishment of the new 3 cents a mile interstate passenger rates on Jan. 10.

Rhode Island Fare Case Jan. 13

The hearing set for Dec. 30 before the Supreme Court of Rhode Island on the appeals taken by several municipalities of the State from the recent ruling of the Public Utilities Commission increasing the fares on the lines of the Rhode Island Company was postponed to Jan. 13 by agreement of counsel.

The hearing was originally set for Dec. 16, but before that date G. Frederick Frost, attorney for the Rhode Island Company, was injured in an automobile accident and at his request the hearing was postponed for two weeks as it was expected by Dec. 30 he would be able to appear in court. His condition, however, did not improve as rapidly as was expected and accordingly another postponement was permitted.

Several months ago the Public Utilities Commission authorized the company to increase fares and approved the establishment of a zone system. This aroused the taxpayers in a number of the towns and East Providence, North Providence, Johnston and Warwick through their attorneys filed an appeal from the ruling of the commission.

Denver Fare Demonstration

Service on the lines of the Denver (Col.) Tramway was completely suspended for six and a half hours on the evening of Jan. 2 because of demonstrations by crowds of men and boys who objected to the collection of a 7-cent fare. Service was resumed early on Jan. 3 on regular schedules.

The trouble began when homeward-bound workmen in the stock yards district refused to pay more than a 5-cent fare, ejected the trainmen and ran the cars into the city. As incoming cars reached the business district, they were abandoned.

The 7-cent fare, which was approved by the State Public Utilities Commission, although opposed by the city officials, was put into effect on Dec. 26. For several weeks previous to Dec. 26 a 6-cent fare had been in effect with the approval of both the State Utilities Commission and the City Council. The conditions of the grant of the 7-cent fare in Denver were reviewed briefly in the ELECTRIC RAILWAY JOURNAL for Dec. 21, page 1119.

Transportation News Notes

Wisconsin Road Wants Increase.—The La Crosse & Onalaska Street Railway, La Crosse, Wis., operating an interurban line, has filed with the Railroad Commission of Wisconsin a petition for an increase in fare.

P-A-Y-E in St. Paul.—The pay-as-you-enter system was adopted for use on the St. Paul lines of the Twin City Rapid Transit Company on Dec. 27. This method of operation has been in use for some time in Minneapolis except on the suburban, intercity and two or three city lines of the company.

Stockton to Charge Six Cents.—The Railroad Commission of California has authorized the Stockton Electric Railroad to charge a 6-cent fare, on the ground that the increase is necessary to meet wage increases and the higher cost of materials and supplies. The company had applied for permission to charge 7 cents.

Columbus Request Denied.—The Public Service Commission of Indiana has denied the petition of the Central Indiana Lighting Company for an increase in fare from 5 to 7 cents at Columbus. As in several other cases decided recently the commission ruled in effect that the war emergency urged by the company in its petition no longer existed.

Kansas City Fare Award Sustained.—The Supreme Court of Missouri on Dec. 31 sustained the Utilities Commission of that State in the 6-cent fare award to Kansas City (Mo.) Railways. All the judges concurred in reversing the Cole County Circuit Court and in ordering the lower court to affirm the action of the commission. This is merely a reflection by the court of the action taken in the St. Louis fare case, referred to previously in this paper and again elesewhere in this issue.

Kokomo Petition Withdrawn.—The Public Service Commission of Indiana on Dec. 26 issued an order permitting the Indiana Railway & Light Company to withdraw the petition it filed with that body some months ago for authority to increase fares in Kokomo. The company filed its motion on Dec. 14, but the commission did not take immediate action on it. The review of the commission indicates that the relief that was asked for by the company would have been denied had the petition been carried to a hearing.

Distinction Between Cash and Ticket Fares.—Because the ticket fare under the new ordinance is 5½ cents on cars of the Cincinnati (Ohio) Traction Company, two persons, a man and woman, attempted to ride on the payment of 11 cents in cash. C. W. Culkins, Street Railroad Director, approved the act of the conductor in ejecting them. The ordinance provides for a cash fare of 6 cents each for passengers and for the sale of tickets at 5½ cents each in strips of six. An increase in fare under the Cincinnati service-at-cost franchise went into effect on Jan. 1.

St. Louis Fare Rehearing Denied.—The State Supreme Court of Missouri has overruled the motion of City Counselor Daues of St. Louis for a rehearing before the court, in connection with its decision reversing the lower court in the 6-cent fare case affecting the United Railways, St. Louis. As explained in the ELECTRIC RAILWAY JOURNAL for Dec. 28, page 1155, the Supreme Court of the State reversed and remanded the decision of Circuit Judge J. G. Slate of the Cole County Circuit Court, who on Sept. 7 held that the Public Service Commission was without jurisdiction to grant an increase in fare.

Plans Appeal to Legislature.—The formal order of notice of a petition to the General Assembly, at its coming session, to amend the charter of the Danbury & Bethel Street Railway, Danbury, Conn., by repealing the portion of section 6 of the charter which provides for the collection of a 5-cent fare within the borough of Danbury and within the borough of Bethel. Since the granting of the charter, in 1885, Danbury has become a city, but the 5-cent fare provisions apply to the limits of the city as now extended. The application is made by Judge J. Moss Ives, as receiver for the company.

St. Louis Company Wants Action.—An early hearing on the proposal for a zone system and on other plans for increasing the revenue of the United Railways, St. Louis, Mo., is reqested in a letter written by President McCulloch of the company to the Public Service Commission of Missouri. Mr. McCulloch declares that the 6-cent fare, with the increase in wages which went into effect even before the fare increase did, does not enable the company to meet its expenses and net a 6 per cent return on the investment, and that further relief must be had. Mr. McCulloch's request for such relief was first made to the commission on Aug. 31.

Auburn Increase Allowed.—The Public Service Commission for the Second District of New York on Dec. 31 authorized the Auburn & Syracuse Electric Railroad to charge a 6-cent fare in Auburn, including the lines to Owasco Lake and to the Sole Cemetery, effective on five days' notice. The increase is during the war and for a reasonable time after the peace treaty becomes effective. Because of franchise restrictions the company's application for 6-cent fare came within the Court of Appeals decision in the Quinby case. The Auburn authorities, however, on Dec. 10 waived the franchise restrictions and submitted the matter to the commission for determination.

Skip Stops Withdrawn in Springfield.—After receiving an order from the Fuel Administration on Dec. 12 A. D. Mackie, general manager of the Springfield (Ill.) Consolidated Railway, announced that the skip stops would be abolished. The fuel administrator at Chicago for the district in which Springfield is located notified the local administrator in Springfield that the matter of skip stops was purely optional with the Council and citizens of Springfield and that he did not insist upon the order being carried out to continue the stops. Mr. Mackie had previously stated to the Mayor that skip stops would be continued in Springfield until the fuel administration ordered otherwise.

Special Courtesy to the Blind.—A step toward greater courtesy was taken by the Tampa (Fla.) Electric Company on Dec. 9 when cards instructing operators to give special assistance were distributed to the blind people of Tampa. A person holding one of these cards may have a car stopped at any place on the line, whether a corner or within the center of a block, and a like convenience will be accorded them when boarding cars. They will only have to stand near the track and hold the card in the air, where it can be seen by the motorman. The new plan to assist the blind was devised by C. F. W. Wetterer, general manager, following a discussion at a meeting of the Blind Welfare Association.

New Albany I. C. C. Hearing, Jan. 22.—Col. Charles L. Jewett, head of the legal department of New Albany, Ind., has been notified that the Interstate Commerce Commission on Jan. 22 will hold an oral argument on the petition of the Louisville & Southern Indiana Traction Company, and Louisville & Northern Railway & Lighting Company, regarding increases in fares between New Albany, Jeffersonville and Louisville. M. A. Pattison, attorney examiner, conducted a hearing on the petition in Louisville last July, after which a finding was returned in which the petition was denied. When the objections of the company were sustained by the commission, Colonel Jewett was apprised of the hearing that has been scheduled.

Front-End Collectors Now "Ground Conductors."—The Dallas (Tex.) Railway is using "ground conductors" to handle the crowds boarding cars in the downtown sections during the rush hours. Under this plan, men with authority to collect fares have been stationed at the most important boarding points on Main, Commerce and Elm Streets. These men stand at the front end of cars as they stop to take on passengers, and the patrons are thus permitted to board the cars by both front and rear entrances, thus effecting a saving in the time required to load the cars. This system of fare collection at congested points has been used elsewhere with success, but to Dallas evidently belongs the credit for coining the term "ground conductors," as applied to the front end collectors.

Gary Increase Denied.—The Public Service Commission of Indiana has denied the application of the Gary Street Railway for an increase of its city fares to 6 cents. This means that the present 5-cent fare will remain in force. The application of the company was filed with the commission on Aug. 8 but the hearing was not held until Nov. 12. The company also asked for authority to increase its fare on the Gary and Hammond line and on the Gary and Indiana Harbor line from 5 cents to the city limits to a fare of 8 cents. Denial of this application was also included in the decision handed down by the commission. This means that the present 10-cent fare between Gary and Hammond and between Gary and Indiana Harbor will remain in force.

Six-Cent Fare Request Refused.—The State Railway Commission of Nebraska on Dec. 28 refused to grant the Lincoln Traction Company an increase in fares on its city lines, and the present 5-cent fare was ordered to remain in force until June 30, 1919, when the commission promises to reconsider the matter. The company's application, filed on Nov. 10, last, asked for a 6-cent fare with an additional charge of 1 cent for transfer privileges. In August last the commission authorized a 5-cent fare, effective from Sept. 1, with 6 cents between certain suburban points. Appeals are now pending in the courts from previous decisions of the commission on fare. Previous reference to the matter were made in the ELECTRIC RAILWAY JOURNAL for Aug. 10, page 262; Sept. 21, page 529; Dec. 7, page 1030.

Tampa Discusses Skip Stops.—The responsibility of eliminating skip stops in Tampa, Fla., will fall on the shoulders of the City Council, if this move is taken in the near future by the Tampa Electric Company. C. F. W. Wetterer, manager, has been informed by the Electric Railway Board at Washington that the fuel administration has not authorized the elimination of the skip stop. The company was on the verge of putting cars back on the old schedules, but the order was rescinded and a letter was written the City Council stating the skip stop would not be eliminated without a resolution from that body ordering stops at every corner. Several of the Councilmen have agitated the elimination of the skip stop and during the week ended Dec. 7 a letter from the city clerk, written at the direction of the Council, asked the railway to get back on the old system.

Butte Denied Seven-Cent Fare.—The Public Service Commission of Montana has denied the petition of the Butte Electric Railway for a cash fare of 7 cents. The commission has also restored the 2½-cent fare for children and mail carriers on duty, thus doing away with the 3-cent fare provided for in its order giving the company the right to increase its fares from 5 cents to 6 cents. This order was made on Nov. 30, and the company had until Dec. 5 to file its schedule of rates in conformity with the rates of 6 cents for adults and 3 cents for children and mail carriers on duty. Before Dec. 5 arrived the company petitioned the commission to amend its order of Nov. 30, by striking therefrom all reference to the tariff for "children and mail carriers on duty, 3 cents," and "all reference to 2½-cent fares and modify the order to provide for a ticket fare of 6 cents for the service as had heretofore been provided for 5 cents and to provide a cash fare of 7 cents."

San Diego Hearing This Month.—A public hearing on the application of the San Diego (Cal.) Electric Railway to the Railroad Commission of California for investigation of rates, and, in fact, all other conditions bearing upon the conduct of the railway will, it is expected, be held in San Diego during the present month. The company, although losing money, is not asking any definite increase in its present fares; it is simply laying its cards face up on the table before the commission and the public with the object of acquainting all concerned with the serious conditions now confronting the owners and management. The company has most carefully prepared its case, giving a detailed history of operation and financial conditions from the horse-car days to the present time. So the public may know, its exhibit may be found at the Chamber of Commerce by all who wish to read it. Copies are also in the hands of city attorneys of San Diego, Coronado, East San Diego and National City.

Municipal Line Increases Fare.—The London & Port Stanley Railway, London, Ont., a municipally-owned radial line, is to have its second war-time rate increase. Rates were fixed following electrification and rehabilitation in 1915. Six months ago passenger and freight tariffs were advanced, but a 30-cent round-trip summer excursion rate was retained for the benefit of residents of London. The commission operating the road reported to the City Council that within the past six months costs increased at the rate of $50,000 per annum, and the Council determined to support an application to the federal parliament to alter the charter by striking out the provision for the 30-cent fare. A rate of 50 cents for adults and 25 cents for children will be substituted. The provincial government has denied an appeal by the city of St. Thomas and the village of Port Stanley for the right to tax the London & Port Stanley Railway, which is now exempt as a publicly-owned utility.

Utica and Syracuse Service Inquiry.—The Public Service Commission for the Second District of New York arranged to confer with the municipal authorities in Utica and Syracuse on Dec. 10 over local transportation facilities. Representatives of the New York State Railways were also invited to attend. At prior conferences arrangements were made whereby additional power service was to be provided the New York State Railways in Utica by the Adirondack Electric Power Corporation, and while there have been delays it is stated they were due to unavoidable happenings. The Adirondack Power Corporation, which is installing a new transmission line from Amsterdam to Utica to enable it to supply more power to the electric railroad, is progressing its contract and the line is expected to be completed by Dec. 15. The commission some time ago investigated transportation conditions in Syracuse with the result that service was improved. The Syracuse conference will be to review the present conditions.

Riders Should Decide Skip-Stop Question.—Thomas E. Mitten, president of the Philadelphia (Pa.) Rapid Transit Company, sent a letter to Councils on Jan. 2 in which he further defended the skip-stop system. He declared the system in full effect increased the company's carrying capacity equal to 200 cars, that it would save $1,000,000 a year and reduce the riding time of patrons on the lines from five to fifteen minutes a day. The number of automobile buses in Philadelphia increased more than 250 per cent since 1914, and to that, according to Mr. Mitten, could be credited a considerable portion of increased electric railway accidents. Mr. Mitten sent with the letter a copy of the address delivered by him on the skip-stop system before the committee of thirteen at a meeting in City Hall on Dec. 27. In connection with this address he again informed Councils that, as publicly stated, the plan of the management of the company provides that the car rider finally shall say whether the skip-stop system shall go or stay.

Charleston Suburban Fare Increase.—It was announced on Dec. 28 that the State Railroad Commission of South Carolina at its next meeting would issue an order allowing an increase in the passenger fares of the suburban lines of the Charleston Consolidated Railway & Lighting Company, effective on Jan. 1. There will be a straight fare of 5 cents from the incorporated limits of the city of Charleston to the Navy Yard, and a straight fare of 3 cents form the Navy Yard to North Charleston, round-trip tickets between the two latter points, however, being 5 cents each. The order of the commission is for ninety days and, at the expiration of that time, should there be no complaint to the commission the revised rate will be permanent. Should there be a complaint, a new hearing will be granted. The increased rates are the result of a hearing held by the commission on Dec. 12. At the time of the award of the War Labor Board in the Charleston wage case that body directed the attention of the commission to the need of more revenue by the company. This phase of the matter was referred to in the ELECTRIC RAILWAY JOURNAL of Dec. 14, page 1068.

Personal Mention

Henry S. Lyons retired on Dec. 31 as secretary of the Boston (Mass.) Elevated Railway.

C. E. Cole has been appointed roadmaster of the York (Pa.) Railways to succeed R. E. L. Kelb.

J. H. Richards has been appointed secretary of the Boise (Idaho) Railway to succeed T. R. Hamer.

H. A. Smeck has been appointed claim agent of the Binghamton (N. Y.) Railway to succeed A. K. Martin.

David Wilson has been appointed secretary of the Railroad Commission of Arkansas to succeed J. B. Dunlap.

W. D. Humphrey has been appointed chairman of the Oklahoma Corporation Commission to succeed J. E. Love.

T. J. O'Connor has been appointed roadmaster of the Texas Electric Railway at Dallas, to succeed J. L. Adams.

Robert MacKenzie has been elected president of the Sarnia (Ont.) Street Railway, Ltd., to succeed James Flinteft.

Charles England has been appointed auditor of the Fort William (Ont.) Electric Railway to succeed J. C. Crawford.

D. L. Waters has been appointed auditor of the United Traction Company, Albany, N. Y., to succeed W. H. Elder.

W. T. Lee has been appointed chairman of the Corporation Commission of North Carolina to succeed Edward L. Travis.

L. Demery has been appointed master mechanic of the Hornell (N. Y.) Traction Company, to succeed M. J. Gordon.

William F. Breidenbach has been appointed secretary of the Sheridan (Wyo.) Railway to succeed William R. Sullivan.

J. Milton has been appointed master mechanic of the Chicago, Aurora & DeKalb Railroad, Aurora, Ill., to succeed William Harmes.

E. H. Mason has been elected second vice-president of the City & Suburban Railway, Brunswick, Ga., to succeed A. deSola Mendes.

S. L. Lupton has been appointed a member of the State Corporation Commission of Virginia to succeed Alexander Forward.

L. LeMay has been elected secretary and treasurer of the Memphis (Tenn.) Street Railway to succeed the late W. H. Burroughs.

Harry K. Tompkins has been appointed secretary of the Fishkill Electric Railway, Beacon, N. Y., to succeed W. H. Southard.

A. Shiel has been appointed auditor of the Northwestern Pennsylvania Railway, Meadville, Pa., to succeed C. H. Allen.

Orin Stiffler has been appointed superintendent of the Indiana County Street Railway, Indiana, Pa., to succeed Irwin Barry.

William J. Bradley has been appointed auditor of the Second Avenue Railway, New York, N. Y., to succeed N. M. Hudson.

C. J. Callahan has been appointed secretary of the Public Utilities Commission of the State of Idaho to succeed E. G. Gallet.

C. D. Donovan has been appointed master mechanic of the City Electric Company, Albuquerque, N. M., to succeed Antonio Vargas.

E. A. Hoffman has been appointed superintendent of transportation of the Wilkes-Barre (Pa.) Railway to succeed C. F. Crane.

George Schneider has been appointed claim agent of the Westchester Electric Railroad, Mount Vernon, N. Y., to succeed A. P. Guion.

J. A. Mower has been appointed claim agent of the Eastern Pennsylvania Railways, Pottsville, Pa., to succeed James E. Burr.

S. R. Inch has been elected vice-president of the Utah Light & Traction Company, Salt Lake City, Utah, to succeed O. J. Salisbury.

E. S. Chesebro has been appointed treasurer of the Yarmouth Light & Power Company, Yarmouth, N. S., to succeed Carl T. Keller.

Frank Gardner has been appointed engineer maintenance of way of the Houston (Tex.) Electric Company to succeed C. R. Brewster.

J. A. Strite has been elected president of the Chambersburg & Shippensburg Railway, Chambersburg, Pa., to succeed W. H. Fisher.

F. A. Zimmerman has been appointed secretary of the Chambersburg & Shippensburg Railway, Chambersburg, Pa., to succeed J. G. Schaff.

A. E. Lane has been elected president of the Ephrata & Lebanon Traction Company, Ephrata, Pa., to succeed Charles O. Collett.

E. C. Given has been appointed treasurer and auditor of the Boise Valley Traction Company, Boise, Idaho, to succeed E. A. Wetmore.

S. W. Hardwich has been appointed master mechanic of the Northern Texas Traction Company, Fort Worth, Tex., to succeed Theodore Taylor.

Herbert W. Trafton has been appointed a member of the Public Utilities Commission of the State of Maine to succeed John E. Bunker, who died some time ago.

Miss Julia A. Prasch has been appointed treasurer of the Yakima Valley Transportation Company, North Yakima, Wash., to succeed C. A. Becker.

C. F. Dupuis has been appointed a member of the Board of Railroad Commissioners of North Dakota, effective Jan. 1, 1919, to succeed C. W. Bleick.

S. Larue Tone, president of the Pittsburgh (Pa.) Railways when it was placed in receivers' hands last April, was on Dec. 31 appointed the third receiver.

J. P. Keeney has been appointed chief engineer of power plants and substations of the Virginia Railway & Power Company, Norfolk, Va., to succeed W. C. Bell.

H. L. Harris, auditor of the Twin State Gas & Electric Company, Brattleboro, Vt., has also been appointed secretary of the company to succeed H. H. Bechtel.

E. H. Kifer has been appointed general manager of the San Antonio (Tex.) Public Service Company to succeed W. B. Tuttle, who still retains his position as vice-president of the company.

William E. McGovern has been appointed auditor of the Eastern Wisconsin Electric Company, Sheboygan, Wis., to succeed Simon Kurtz, who has been appointed assistant auditor of the company.

J. P. Costello has been appointed superintendent of railways of the Reading Transit & Light Company, Reading, Pa., to succeed S. E. Smith, who is now general superintendent of the company.

E. F. Goetz, master mechanic of the Chambersburg & Shippensburg Railway, Chambersburg, Pa., has also been appointed general manager and purchasing agent of the company to succeed S. M. Coover.

J. S. Goldsmith has been appointed assistant general counsel of the Public Service Commission of Maryland, Baltimore, Md., to succeed Osborne I. Yellott. James C. Legg has also been appointed as a commissioner.

P. E. McChesney has been appointed purchasing agent of the Eastern Texas Electric Company at Beaumont to succeed E. J. Davis, who now has general supervision over the city and interurban lines of the company.

E. P. Summerson has been appointed secretary of the Lehigh Power Securities Company, New York, N. Y., which controls the Lehigh Valley Transit Company, Allentown, Pa., to succeed A. E. Smith, who still retains his position as treasurer.

L. B. Martin has been appointed to the newly created position of general superintendent of interurban lines of the Illinois Traction System, with headquarters in Springfield. Mr. Martin has been superintendent of maintenance of way of the company for several years past. His successor as superintendent of maintenance of way has not been named.

Thomas B. Pratt, formerly with the publicity department of the New York, New Haven & Hartford Railroad, has succeeded Peter D. Vroom as publicity manager of Henry L. Doherty & Company, New York, N. Y. Mr. Vroom is to take up active newspaper work in another city.

F. D. Howells, former chief engineer of public utilities for the city of Los Angeles, has become general manager of the California Highway Transportation Association. This organization, made up of freight and passenger automobile companies, is endeavoring to aid in the development of workable state laws governing automobile transportation utilities.

F. W. Bedard has been appointed general superintendent of the Urbana & Champaign Railway, Gas & Light Company, Champaign, Ill., and E. A. Roehry has been made general superintendent of the Cairo Railway & Light Company, Cairo, Ill., according to announcement from the office of H. E. Chubbuck, vice-president, executive of the Illinois Traction System.

Frank Ring has been appointed traffic manager of the Walla Walla (Wash.) Valley Railway. Mr. Ring formerly was employed by the Pacific Power & Light Company and later was promoted to the management of the Kennewick office, which place he resigned to take a position in the Baker-Boyer Bank in Walla Walla. He succeeds E. G. Miller as traffic manager of the railway.

Joseph H. Lyons, widely known among labor union men of the Coast, has been appointed superintendent of transportation on the Tacoma (Wash.) Municipal Railway. Mr. Lyons assumed his new duties on Jan. 1, when the city took over the city-owned lines from the Tacoma Railway & Power Company, which has been operating them ever since they were opened.

A. A. Blackburn, who for fourteen years has been chief engineer and assistant to the general manager of the Belfast (Ireland) City Tramways, has been appointed engineer and manager of the Huddersfield Corporation Tramways to succeed R. H. Wilkinson, whose appointment as manager of the Bradford City Tramways was noted in the ELECTRIC RAILWAY JOURNAL for Dec. 7, page 1017.

Herman M. Aldrich for the last four years superintendent of the Northampton (Mass.) Street Railway, and for ten years superintendent of the Amherst & Sunderland Railway, has resigned to become superintendent of the Claremont Railway & Lighting Company, Claremont, N. H., the property of which was sold recently to local manufacturers of Claremont after abandonment had been threatened by the original owners.

Godfrey Goldmark has been appointed counsel to the Public Service Commission for the First District of New York to succeed Judge William L. Ransom, whose resignation took effect at midnight on Dec. 21. Mr. Goldmark formerly was a partner of ex-Judge Hiram R. Steele. He entered the commission as secretary to Chairman Straus. A year later he became assistant counsel and recently has specialized in regulation.

J. M. Barry has been appointed local manager of the Alabama Power Company at Anniston, Ala., to succeed Laurence W. Jackson resigned. For some time Mr. Barry was in charge of the distribution of electricity for the Great Western Power Company, at San Francisco, and prior to that was chief of the San Francisco department of electricity, to which position he came from Portland, Oregon, where he was electrical engineer for the Northwestern Electrical Company.

H. Ware Barnum, Ware, Mass., has been appointed general counsel for the Boston (Mass.) Elevated Railway, according to announcement made by the trustees of the company. Mr. Barnum has been Assistant Attorney-General of Massachusetts since January, 1915. He is about forty years old and for a number of years was a member of the firm of Elder, Whitman & Barnum. He has had a large experience in legislative work. He is a graduate of St. Lawrence School, New York; Harvard, A. B., 1900, and the Harvard law school, 1903. Mr. Barnum succeeds Russell A. Sears.

S. T. Phillips, heretofore general electrical equipment foreman, New York State Railways, Rochester Lines, has resigned to become master mechanic of the Gary (Ind.) Street Railway. Previous to going to Rochester Mr. Phillips was associated with J. F. Uffert, now superintendent of equipment New York State Railways, when Mr. Uffert was master mechanic of the Hudson Valley Railway and the United Traction Company, at Glens Falls and Albany, N. Y., respectively. He was for a number of years connected with the New York Edison Company and the Hudson River Electric Power Company, Glens Falls, N. Y.

Lindley Miller Garrison, receiver for the Brooklyn (N. Y.) Rapid Transit Company, was born in Camden, N. J., in 1864. He was educated in the public schools, at Philip Exeter Academy, at Harvard, New York University, Rutgers and Brown and was awarded the LL.D. degree at New York University. He studied law in the offices of Redding, Jones & Carson in Philadelphia and was admitted to the Pennsylvania bar in 1886. He practiced with Redding, Jones & Carson and their successors, Jones & Carson, from 1883 to 1888. In the latter year he was admitted to the bar of New Jersey and practiced at Camden, N. J., until 1898. From 1899 to 1904 he was a member of the firm of Garrison, MacManus & Enright, Jersey City. He was vice-chancellor of New Jersey from June, 1904, to March 5, 1913, and was Secretary of War in the cabinet of President Wilson from March 5, 1913, until Feb. 10, 1916, when he resigned. He was lately been a member of the law firm of Hornblower, Miller, Garrison & Potter, New York.

Obituary

Mr. Turner Dead

Walter V. Turner, manager of engineering for the Westinghouse Air Brake Company, died at Columbia Hospital, Wilkinsburg, Pa., on Jan. 9. He had been seriously ill since the middle of November. In his death the air-brake industry has lost its greatest expert.

Mr. Turner was born in England in 1866, and before he came to America in 1888 he was in the wool business. After a short time spent on a ranch in New Mexico, he entered the employ of the Atchison, Topeka & Santa Fe Railroad and soon became chief inspector. Becoming interested in air brakes, he soon gained a reputation for proficiency in them and was placed in charge of the air-brake instruction car on that road. From general air-brake instructor he was promoted to mechanical instructor for the entire system. During this time he took out twenty-two air-brake patents, which were sold to the Westinghouse Air Brake Company.

He became connected with the Westinghouse Company in 1903; in 1907 he was made mechanical engineer; in 1910, chief engineer; in 1915, assistant manager and in 1916, manager of engineering. His first task with that company was to develop the K triple valve, of which there are now over 2,000,000 in use. By his untiring energy and ingenuity the art of braking trains has developed by leaps and bounds. He has taken out more than 400 patents and a hundred or more are still pending. Among his latest inventions are those which have contributed extensively to the success of electric train operation, the electro-pneumatic brake and the system of empty and load brake control stand out preeminently. By making use of these features the capacity of the New York subways has been increased tremendously. Mr. Turner was also an author, among the more important of his books being "Train Control—Its Development and Effect on Transportation Capacity," which was published in two volumes. He was awarded the Longstreth medal in 1911, and the Elliott-Cresson medal in 1912. He was a fellow of the Royal Society of Arts, England, and a member of the American Society of Mechanical Engineers, the American Electric Railway Association, Franklin Institute (Philadelphia), and the Pennsylvania State Chamber of Commerce. The degree of "Doctor of Engineering" was conferred on him by the University of Pittsburgh in 1918.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Soft Coal Output Increased Six Per Cent in 1918

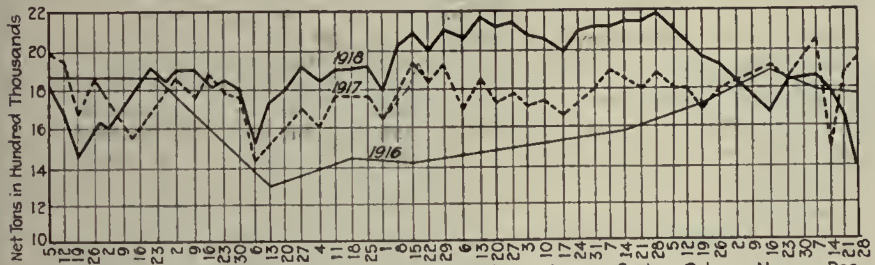
Production for the Last Year Estimated by the Geological Survey at 447,748,000 Net Tons

The lowest weekly production of bituminous coal reported in the last three years was brought about by the time lost on account of the Christmas holidays during the week ended Dec. 28, according to the Geological Survey. Estimates for this week place production at 6,385,000 net tons, 3,746,000 net tons or 37 per cent behind production of the week ended Dec. 21, and 3,352,000 net tons or 34 per cent behind production of Christmas week of last year. The average daily production for the current week (five days) is estimated at 1,277,000 net tons as compared with 1,913,000 net tons for this coal year to date and 1,763,000 net tons for the same period of 1917.

BITUMINOUS PRODUCTION INCREASED 35,187,000 TONS IN NINE MONTHS

Total production of bituminous coal for the period April 1 to Dec. 28 is estimated at 447,748,000 net tons as against 412,561,000 net tons during the period April 1 to Dec. 28, 1917, or an increase of 35,187,000 net tons.

The production of bituminous coal and lignite in the calendar year 1918 is estimated at 585,883,000 net tons, an increase compared with 1917 of 34,092,000 net tons or 6.2 per cent. Four states reported decreases, Georgia, Iowa, Missouri and Texas. The most important increases were in Pennsylvania, 11,264,000 tons, Ohio, 5,715,000 tons, Illinois, 5,064,000 tons and West Virginia, 4,908,000 tons. The estimates indicate that West Virginia still retains second place as a coal producer but the lead is so small that final returns may place Illinois in this place, which was assumed by the State of West Virginia in 1908.



ESTIMATED AVERAGE TOTAL PRODUCTION FOR WORKING DAY OF BITUMINOUS COAL, INCLUDING COAL COKED

The loss of time brought about by the Christmas holidays caused anthracite production during the week of Dec. 28 to decrease more than 500,000 net tons, compared with the production of the week preceding and was approximately 200,000 net tons lower than the production during the corresponding week of 1917. For the period April 1 to Dec. 28 the production of anthracite is estimated at 73,830,000 net tons which is 1,606,000 net tons or slightly more than 2 per cent below the production of a similar period of last year.

Copper Wire Goes Lower

Rubber Covered on 27 to 28-Cent Base, Represents a Drop of Seven Points

As a result of the drop in copper price wire has fallen many points. Of ten prominent manufacturers three were quoting on Monday 27 cent base on rubber-covered, two 28 cents, four 30 cents, and one 32 cents. Considering discounts, however, rubber-covered base is probably between 27 and 28 cents, a drop of around seven points. Quite recently one or two manufacturers have stopped selling on base, and they are now selling on cost.

On Saturday bare wire was quoted in Chicago at from 25 to 26 cents, while weatherproof ranged from 28 to 29 cents a pound.

Since Monday copper has made further reductions and if the wire quotations continue to follow the downward trend of copper still lower prices should prevail next week.

A prominent wire producer said a couple of weeks ago that the wire people could expect to do business on 19-cent copper. Deliveries in the second quarter of the year are already selling at this figure it is understood. Spot electrolytic copper on Tuesday was quoted at 20.62½ cents and there were some recessions from that price later in the week.

Iron and Steel Scrap Prices Drop

Mills Making Almost No Bids, But Dealers Holding Off Until More Definite Prices Develop

Iron and steel scrap values are still dropping and no sales of any consequence are being made. The drop here is greater than in the new product.

Almost no bids are being made by consumers, and dealers still hesitate to buy while values are so uncertain.

A further disturbing factor is the heavy offering of scrap arising from the termination of war contracts. The Canadian government is offering around 150,000 tons of scrap and the U. S. Government is known to hold a large tonnage. This, however, is expected to come on the market only slowly so that values will not be unduly sacrificed.

Dealers seem to feel that it will be several weeks before any definite and safe market for scrap develops.

It is hard to secure any real quotations but resales were made this week on the following basis in Chicago:

Rerolling and short old steel rails, $24.00-$25.00 per gross ton; frogs, switches and guards, $19.00-$20.00 per gross ton, car wheels $24.00-$25.00 per gross ton, old iron rails, $26.00-$28.00 per gross ton; old iron and steel axles, $28.00-$30.00 per net ton.

With the exception of old steel rails which are quoted in New York as $17.00-$18.00 per gross ton, the Chicago prices above quoted are lower than the quotations received for the Pittsburgh, Cincinnati, New York and Philadelphia districts. In these cases, however, prices are f.o.b. buyer's mill, whereas the Chicago quotations were based on exchanges between dealers and brokers.

G. E. Employees Back

Men Return as Work Is Provided—Company Does Not Admit Jurisdiction of War Labor Board

A hearing was held in New York on Wednesday of this week by the War Labor Board in the General Electric Company sympathetic strike case. At its conclusion the board announced that it would take under consideration and state later whether or not it would assume jurisdiction in a case where one of the parties was unwilling to be bound by the decision.

Manager H. Griswold, Jr., of the Erie Works expressing his unwillingness to submit the controversy to the board or to be bound by any finding it might make, expressed willingness to refer any differences to the system of representatives at Erie which is similar to that set up by the War Laboar Board at Pittsfield and Lynn. E. W. Rice, president of the company, said that the only controversy between the management and the workers existed at Erie, where 20 per cent of the employees went out because of alleged unfair discharge of ten men. The Schenectady and Pittsfield plants were working under an award of the War Labor Board, and in violation all Schenectady employees and 50 per cent of the Pittsfield employees went out in sympathy. The Fort Wayne works were operating under an agreement between the management and workers made through a Department of Labor representative, and in violation of it 75 per cent went out in sympathy.

So far as work was available, the men at the various plants have gone back. At Schenectady, where about 15,600 went out, all but about 1000 have been taken back, and there was no work for these at the time. The situation is similar at the other works. None were out at Lynn. The men were taken in a preferential order, the general result being that first preference is given to those who had been in war service, then those having dependents, etc.

The Department of Labor does not look forward to any unemployment crisis, according to a statement on the general labor situation by Assistant Secretary of Labor, Louis F. Post: "There is no reason," he says, "why either business men or wage-earners should be apprehensive with regard to commercial stagnation. The war has on the whole increased the purchasing power of the masses and has created new markets. America must assist in the rebuilding of Europe, and avenues for foreign trade hitherto closed to us are now open. Raw materials which were denied to private and non-essential industry during the war are now accessible to the manufacturers of America through their release by the War Industries Board. Credits which were similarly denied to private concerns because they were needed for Government use have also been released by the Capital Issues Committee. There is no reason for anyone to be alarmed over the future."

Street Cars Still Subject to Mexican Tariff

By the decree of Aug. 27, 1918, machinery of all kinds unless otherwise specified, as well as separate parts, was to be admitted free of charge into Mexico. Subsequently, however, by the circular of Oct. 21, 1918, the Director General of Customs of Mexico directed that exceptions be made in the case of certain articles which will continue to stay at the old rate of 45 cents per 100 lb. gross weight. Included in the articles still subject for duty, as transmitted by Vice-Consul Joseph W. Rowe of Mexico City, are motor cars for railway use, and electric batteries.

Track and Roadway

Waterbury & Milldale Tramway, Waterbury, Conn.—It is reported that the Waterbury & Milldale Tramway contemplates the construction of an extension from South Street, Bristol, over Wolcott Street and through Wolcott, connecting with the car line from Waterbury to Hotchkiss Lake. J. H. Cassidy, secretary.

Detroit (Mich.) United Railway.—Two new extensions have recently been placed in operation by the Detroit United Railway. One of these lines is the Northwestern Belt Line, a single-track extension of the Hamilton line operating to Woodward Avenue through the company's carhouse and shop property in Highland Park and connecting with Grand River Avenue near the westerly city limits. This line will later be double-tracked. The other line placed in operation is the Ferndale line from Springwells Avenue, around the edge of Woodmere Cemetery to Dearborn Avenue and connecting with Fort Street. A branch line is being built northward paralleling with Solvay Avenue.

Cincinnati (Ohio) Traction Company.—**Walter A. Draper**, vice-president of the Cincinnati (Ohio) Traction Company, recently notified city officials that the company is prepared to lay new rails on Eastern, Freeman and Central Avenues whenever the city is ready to undertake improvements on those streets.

Peterboro (Ont.) Street Railway.—The Hydro-Electric Power Commission of Ontario, which operates the Peterboro Street Railway, reports that it proposes to erect 20 single-track miles of overhead construction.

Trenton, Bristol & Philadelphia Street Railway, Philadelphia, Pa.—This company reports that during 1919 it will reconstruct 3 or 4 miles of track if labor can be procured.

Dallas (Tex.) Railway.—Plans of the Dallas Railway for 1919 call for the completion of its building program which is now under way. The program involved the expenditure of $800,000. About half of that sum has now been spent. The remainder is to be spent this year. This is in improvements and extensions. The maintenance charges and general repairs for 1919, it is expected, will be higher than usual because it has been difficult to keep up with the demands during 1918. The plans for extensions call for the building of the Oak Lawn line out to the cemetery. The Second Avenue extension is just being completed. There will be some work in Oak Cliff, the Colonial Avenue line is to be double-tracked and the Lake Avenue line is to be extended to the hospital. It is probable that additional plans for extensions will be made during 1919 and some of the additional work will doubtless be under way before the close of the year.

Power Houses, Shops and Buildings

Southwestern Gas & Electric Company, Texarkana, Ark.—Fire recently destroyed the carhouse of the Southwestern Gas & Electric Company, together with twelve cars, causing a loss of about $100,000.

Pacific Electric Railway, Los Angeles, Cal.—A new passenger station has recently been completed by the Pacific Electric Railway at Fullerton.

Washington Railway & Electric Company, Washington, D. C.—A contract has been awarded by the Washington Railway & Electric Company to Lake Stone, Washington, for the construction of a new one-story, concrete substation at Fourteenth and East Capitol Streets, at $3,000.

Hammond, Whiting & East Chicago Railway, Chicago, Ill.—This company advises that during 1919 it expects to construct a new 400-kw substation and an addition 50 x 50 ft. to its carhouse.

Danville Street Railway & Light Company, Danville, Ill.—The carhouse of the Danville Street Railway & Light Company, containing nine city cars, was recently destroyed by fire, causing a loss of about $75,000.

Chicago & Joliet Electric Railway, Joliet, Ill.—A report from the Chicago & Joliet Electric Railway states that during 1919 it proposes to install one 1500-kw substation at Joliet, one 300-kw. automatic substation at Dellwood Park and 6000 ft. of 250,000 C.M. 12,000-volt underground cable connecting the Joliet substation with the substation of the Public Service Company at Jackson and Ottawa Streets. All equipment has been purchased, except cable and small material, such as bus bar supports, disconnect switches, insulator racks, etc.

New Advertising Literature

Eugene F. Phillips Electrical Works, Ltd., of Montreal, Canada: A 270-page handbook entitled "Phillips' Wires and Cables." The book, which is pocket-size and handsomely bound in leather, is printed on coated paper, is illustrated and comprises five sections. The subjects of these are electrical conductors, bare and weatherproof wires and cables, magnet wires and cotton-covered wires, rubber-insulated wires and cables and flexible cords, paper-insulated power cables and telephone cables and varnished-cambric insulated cables, and general information. Aside from the complete information furnished about the company's many different varieties of wires and cables, tables of wire weights and diameters and other very useful information to the wire user are given.

Rolling Stock

St. Cloud (Minn.) Public Service Company expects to purchase two motor cars this week.

Municipal Railway of San Francisco expects to purchase this year five automobile buses and twenty 32-ft. steel city passenger cars.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., intends to purchase some time during the year one single-truck work car, 30 ft. over all.

Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va., expects to purchase ten steel ash cars this year.

Winnipeg (Canada) Electric Railway is reconstructing its present rolling stock at the rate of ten cars per month, forty cars having already passed through its hands. It is understood that the ten new cars that were ordered from the Ottawa Car Company, as reported in the July 31 issue of the ELECTRIC RAILWAY JOURNAL are at present in the last stages of construction.

Trade Notes

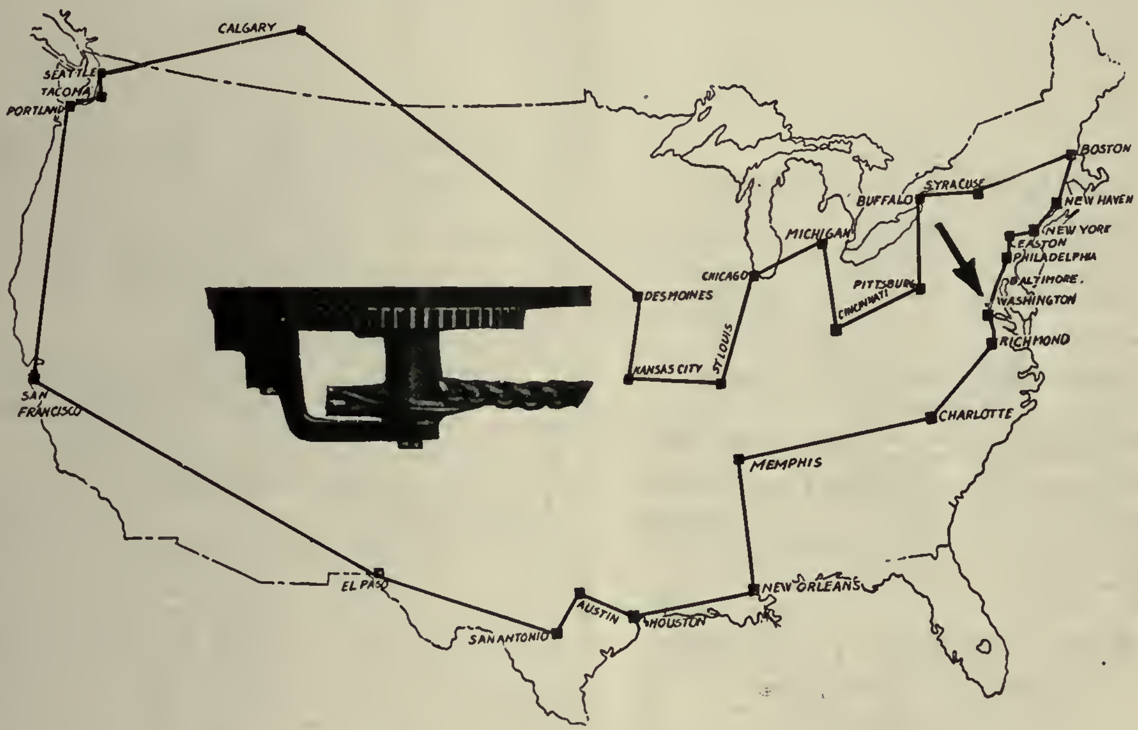
C. E. A. Carr Company, Montreal and Toronto, has added H. F. Powell to its selling force.

Ohmer Fare Register Company states in a recent issue of its house organ, the *Ohmer Fare Register*, that there is a demand for the company's product greater than it can supply and that when peace comes a bigger business than ever in registers is expected.

Walter N. Polakov, consulting engineer, announces the founding of Walter N. Polakov & Company, Inc., consultants in power production methods, industrial investigations, labor problems, scientific record systems and production accounting, with offices at 31 Nassau St., New York City. With the close of hostilities a number of capable engineers formerly associated with him have joined the staff of the corporation.

National Car Coupler Company, Attica, Ind., has issued a statement in which it is affirmed that 93 per cent of its employees have petitioned the company to continue operation under the old system, and have voluntarily waived any rights they might have under the recent award of the National War Labor Board granting a basic eight-hour day, collective bargaining and reinstatement of certain discharged employees. The statement says that in view of this petition and of its harmonious relations with its employees during twenty years of its existence, the company "respectfully but decidedly declines to abide by the award."

Peacock Brakes from Coast to Coast



Peacock Brakes are Standard in crowded Washington

Both the Capital Traction Company in ordering 20 cars and the Washington Railway & Electric Company in ordering 50 cars specified Peacock Brakes—the newer type, with the chain winding up instead of down.

Proven safety, satisfactory schedules and maximum maintenance economy were naturally the primary considerations—all three met by Peacocks.

A hand brake must be mighty good to be used as the only brake on several hundred (Washington R. & E.) cars.

Practically all Washington cars carry Peacocks. There must be no brake delays or brake accidents on the lines in the nation's capital. You cannot get a brake easier to maintain than the Peacock.

Washington & Virginia have Peacocks specified on 40 new cars.

Next Stop—RICHMOND

National Brake Co.

Buffalo, N. Y.

Bankers and Engineers

Ford, Bacon & Davis,
Engineers.
115 BROADWAY
New Orleans NEW YORK San Francisco

STONE & WEBSTER
Industrial Plants and Buildings, Steam Power Stations, Water Power Developments, Substations, Gas Plants, Transmission Lines, Electric and Steam Railroad Work.
NEW YORK BOSTON CHICAGO

SANDERSON & PORTER
ENGINEERS
REPORTS, DESIGNS CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS
RAILWAY, LIGHT and POWER PROPERIES
CHICAGO NEW YORK SAN FRANCISCO

THE ARNOLD COMPANY
ENGINEERS—CONSTRUCTORS
ELECTRICAL—CIVIL—MECHANICAL
105 South La Salle Street
CHICAGO

ALBERT S. RICHEY
ELECTRIC RAILWAY ENGINEER
WORCESTER POLYTECHNIC INSTITUTE
WORCESTER, MASSACHUSETTS

A. L. DRUM & COMPANY
CONSULTING AND CONSTRUCTING ENGINEERS
VALUATIONS AND FINANCIAL REPORTS
CONSTRUCTION AND MANAGEMENT
OF ELECTRIC RAILWAYS
76 West Monroe St. CHICAGO, ILL.

THE P. EDW. WISH SERVICE, Inc.
Suite 1710 DETECTIVES *Suite* 715
Park Row Bldg., New York Board of Trade Bldg., Boston

ELECTRICAL TESTING LABORATORIES
Electrical, Photometrical and
Mechanical Testing.
80th Street and East End Ave., New York, N. Y.

THE J. G. WHITE COMPANIES
ENGINEERS CONTRACTORS
FINANCIERS OPERATORS
43 EXCHANGE PLACE . . NEW YORK
LONDON CHICAGO

JOHN A. BEELER
OPERATING AND RATE INVESTIGATIONS
TRAFFIC SURVEYS AND SCHEDULES
Electric Railway Management—Supervision of Construction
ENGINEERING APPRAISALS
52 VANDERBILT AVE., NEW YORK

REPUBLIC ENGINEERS, INC.
CONSULTING AND CONSTRUCTING ENGINEERS
Valuations *Reports* *Investigations*
Designs *Construction* *Management*
60 BROADWAY, NEW YORK
CLEVELAND, OHIO YOUNGSTOWN, OHIO
Illuminating Bldg. Mahoning Bank Bldg.

You are a faithful subscriber and reader of the Electric Railway Journal. You know how useful it is to you. Why not give us the names of those of your electric railway friends who would also benefit by being subscribers to the Electric Railway Journal? We will be glad to send specimen copies to any names and addresses that you mention.
ELECTRIC RAILWAY JOURNAL

WOODMANSEE & DAVIDSON ENGINEERING CO.
ENGINEERS
MILWAUKEE CHICAGO
First National 784 Continental & Commercial
Bank Bldg. National Bank Bldg.

THE MOST SUCCESSFUL MEN IN THE ELECTRIC RAILWAY INDUSTRY READ THE
ELECTRIC RAILWAY JOURNAL
EVERY WEEK

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

Scofield Engineering Co. Consulting Engineers
PHILADELPHIA, PA.
POWER STATIONS GAS WORKS
HYDRAULIC DEVELOPMENTS ELECTRIC RAILWAYS

AMERICAN BRIDGE COMPANY
HUDSON TERMINAL-30 CHURCH STREET, NEW YORK

Manufacturers of Steel Structures of all classes particularly BRIDGES AND BUILDINGS

Sales Offices

NEW YORK, N. Y. . . . 30 Church Street
Philadelphia, Pa. . . . . Widener Building
Boston, Mass. . . . John Hancock Building
Baltimore, Md. . . . Continental Trust Building
PITTSBURGH, PA. . . . Frick Building
Buffalo, N. Y. . . . Marine National Bank
Cincinnati, Ohio . . . Union Trust Building
Atlanta, Ga. . . . . . Candler Building
Cleveland, Ohio . . . . Guardian Building
Detroit, Mich. . . Beecher Ave. & M. C. R. R.
CHICAGO, ILL. . . 208 South La Salle Street
St. Louis, Mo. . Third National Bank Building
Denver, Colo. . First National Bank Building
Salt Lake City, Utah . . Walker Bank Building
Duluth, Minn. . . . . . Wolvin Building
Minneapolis, Minn. . . 7th Ave. & 2nd St., S. E.

Pacific Coast Representative:
U. S. Steel Products Co., Pacific Coast Dept.:
San Francisco, Cal. . . . . Rialto Building
Portland, Ore. . . . . . Selling Building
Seattle, Wash. . . 4th Ave. So., Cor. Conn. St.

Export Representative: United States Steel Products Co., 30 Church St., N. Y.

During my absence in the service of the Ordnance Department, U. S. Army, I have not been in close touch with my customers and friends in the electric railway field. It has not been possible, during the war, to give the deserved attention to the electric railways. I have recently been relieved from service and from Jan. 10th, I shall devote my entire time to the manufacture and sale of Differential Electric Dumping Cars. If you are in the market for early spring delivery let us hear from you at once.

H. FORT FLOWERS, *Prest. and Genl. Mgr.*

DIFFERENTIAL CAR COMPANY, INC.
141 Broadway, New York

Sleet Days Are Here!

Delay No Longer—
Get a Full Supply of

Columbia Trolley Wheels

In addition to our standard solid trolley wheels for general service, we direct your attention to the

Columbia Sleet Cutting Wheel

The ideal trolley wheel for insuring uninterrupted collection of current during the prevalence of hail, sleet, snow or ice. Does its work effectively without the aid of auxiliary sleet-cutting devices.

Columbia trolley wheels of both types in diameters of 4-in., 5-in. and 6-in. are in stock ready for immediate shipment. You can meet many other of your wants by ordering from this general list of Columbia products.

Below are some Columbia-Made specialties conveniently listed.

Columbia Machine Works & Malleable Iron Co.

Atlantic Ave. and Chestnut St.
Brooklyn, N. Y.
W. R. Kerschner Co., Inc., N. Y.
Holden & White, Inc., Chicago
F. F. Bodler, San Francisco
Railway & Power Eng. Corp. Ltd., Toronto, Ont.

TOOLS

- Armature and Axle Straighteners
- Armature shaft straighteners
- Armature buggies and stands
- Babbitting molds
- Banding and heading machines
- Car-hoists
- Car replacers
- Coil Tapping machines for armature leads
- Coil winding machines
- Pinion pullers
- Pit jacks
- Signal or target switches
- Tension stands

CAR EQUIPMENT

- Armature and axle bearings
- Armature and field coils
- Bearings (axle and armature)
- Brush-holders and brush-holder springs
- Brake, door and other handles
- Brake forgings, riggings, etc.
- Car trimmings
- Commutators
- Controller handles
- Forgings of all kinds
- Gear cases (steel or malleable iron)
- Grid resistors
- Third-rail shoe beams and accessories
- Trolley poles (steel) and wheels

The City of Seattle Selects Allis-Chalmers Turbo Generators

THE Auxiliary Steam Electric Plant of the City of Seattle was placed in operation in September 1914 and the initial generating machinery consisted of one 7500 K. W. Allis-Chalmers Turbo Generator Unit. When it became necessary to increase the capacity of the plant, the City again chose Allis-Chalmers equipment and the second unit, a 10,000 K. W. machine, has recently been placed in operation.

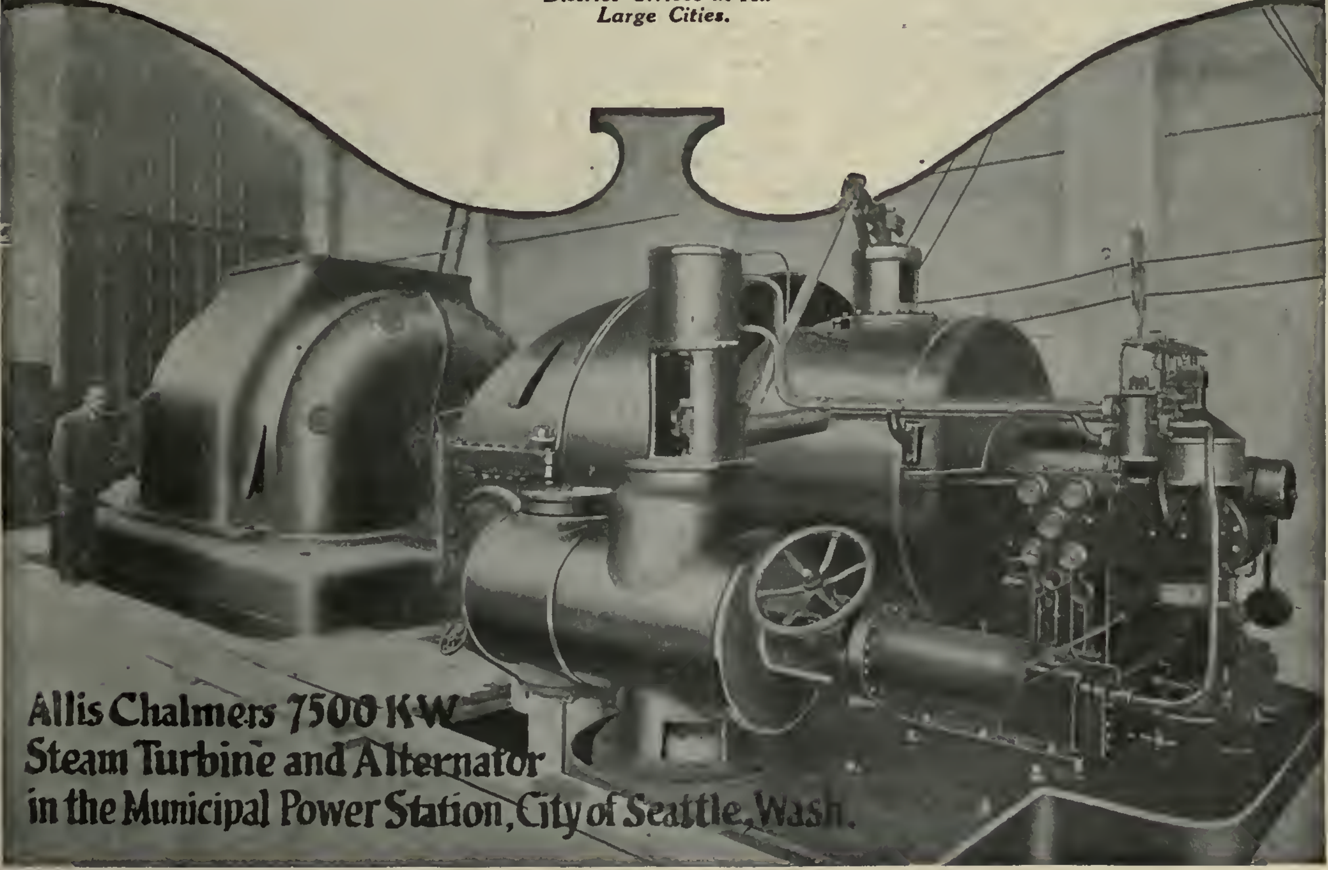
Allis-Chalmers Steam Turbines sell on their operating record.

Allis-Chalmers Manufacturing Company

Complete Power and Electrical Equipment

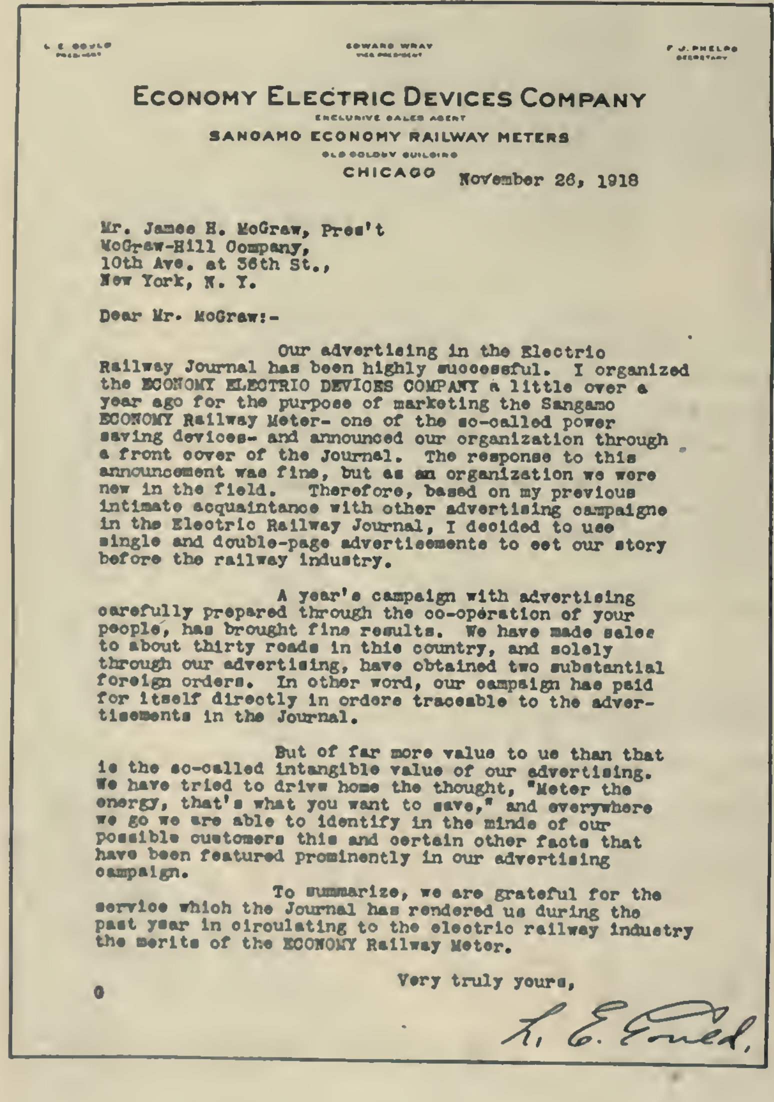
Milwaukee, Wisconsin

District Offices in All Large Cities.



Allis Chalmers 7500 K-W
Steam Turbine and Alternator
in the Municipal Power Station, City of Seattle, Wash.

Logical as Mathematics!



L. E. GOULD
PRESIDENT

EDWARD WRAY
VICE PRESIDENT

F. J. PHELPS
SECRETARY

ECONOMY ELECTRIC DEVICES COMPANY
EXCLUSIVE SALES AGENT
SANGAMO ECONOMY RAILWAY METERS
OLD COLONY BUILDING
CHICAGO

November 26, 1918

Mr. James H. McGraw, Pres't
McGraw-Hill Company,
10th Ave. at 36th St.,
New York, N. Y.

Dear Mr. McGraw:-

Our advertising in the Electric Railway Journal has been highly successful. I organized the ECONOMY ELECTRIC DEVICES COMPANY a little over a year ago for the purpose of marketing the Sangamo ECONOMY Railway Meter- one of the so-called power saving devices- and announced our organization through a front cover of the Journal. The response to this announcement was fine, but as an organization we were new in the field. Therefore, based on my previous intimate acquaintance with other advertising campaigne in the Electric Railway Journal, I decided to use single and double-page advertisements to set our story before the railway industry.

A year's campaign with advertising carefully prepared through the co-opération of your people, has brought fine results. We have made sales to about thirty roads in this country, and solely through our advertising, have obtained two substantial foreign orders. In other word, our campaign has paid for itself directly in orders traceable to the advertisements in the Journal.

But of far more value to us than that is the so-called intangible value of our advertising. We have tried to drive home the thought, "Meter the energy, that's what you want to save," and everywhere we go we are able to identify in the minds of our possible customers this and certain other facts that have been featured prominently in our advertising campaign.

To summarize, we are grateful for the service which the Journal has rendered us during the past year in circulating to the electric railway industry the merits of the ECONOMY Railway Meter.

Very truly yours,

G

L. E. Gould.

"I decided to use single and double page advertisements to set our story before the railway industry."

+

"Our campaign has paid for itself directly in orders traceable to the advertisements in the Journal."

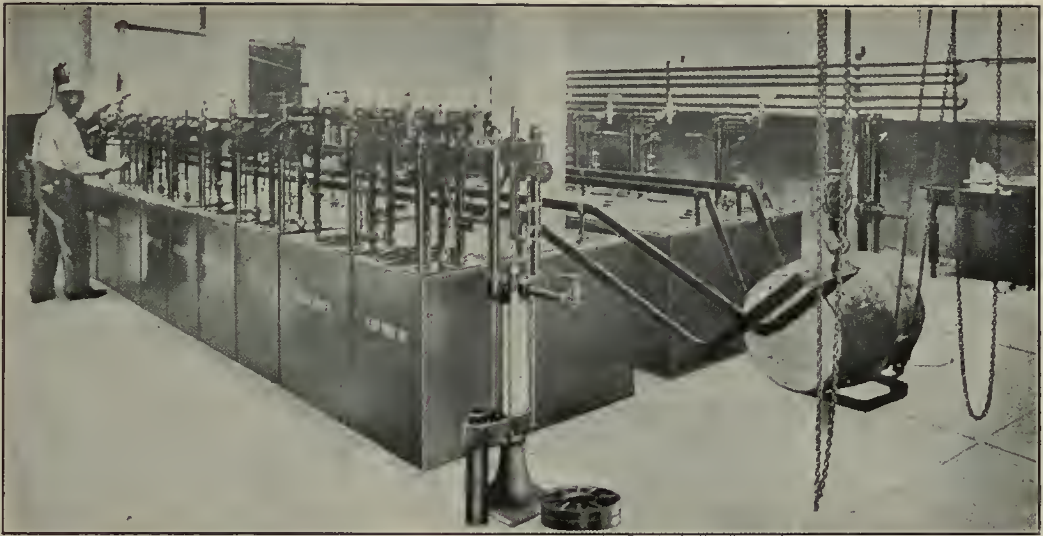
+

"But of far more value is the so-called intangible value of our advertising . . . Everywhere we go we are able to identify in the minds of our possible customers certain facts featured in our advertising campaign."

RESULT = "Sales to about 30 roads and two substantial foreign orders"

Journal Readers Respond

Electric Railway Journal



No Oil Wasted Here

This photograph, taken in the oil house of one of the most efficiently managed Street Railway Companies, strikingly illustrates how economically oil is handled with a Gilbert & Barker Oil Storage System.

Barrels are handled with minimum labor—every drop drained from barrels—stored in dust-proof, leak-proof tanks—accurately measured as pumped into can—no splash or drip—every gallon checked in and out—and fire hazards eliminated.

Send for Bulletin 21, showing installations.

GILBERT & BARKER MANUFACTURING CO.
Established 1865
SPRINGFIELD, MASSACHUSETTS, U. S. A.

**Let Us
Labor Together,
"Industries of
America"
to Unfetter the
Hands of Universal Freedom**

THE VAN DORN & DUTTON COMPANY
Gear Specialists
Cleveland, Ohio

Sales Offices: Chicago, Chattanooga, Denver, Kansas City, Los Angeles, New York, St. Louis, San Francisco, Toronto, Salt Lake City, Seattle. Frank Ridlon Company, Boston, Mass., New England Representative.

"STANDARD"

Steel Tires Steel Tired Wheels
Solid Rolled Steel Wheels
O. H. Steel and Malleable Iron Castings
Solid Forged Gear Blanks
Steel Forgings Iron Forgings
Forged and Rolled Steel
Pipe Flanges
Ring Dies Rings Roll Shells
Steel Springs

S BRAND *"The 'Standard' Brand on your material is an assurance of eventual economy."* S BRAND

STANDARD STEEL WORKS CO.

GENERAL OFFICES:
MORRIS BUILDING, PHILADELPHIA, PA.

CHICAGO
ST. LOUIS
HAVANA, CUBA
RICHMOND
SAN FRANCISCO
NEW YORK
MONTEREY, MEX.
MEXICO CITY
LONDON, ENGLAND
PARIS, FRANCE

"The Quality Shops"
CARS SLCo TRUCKS

Reconstruction

These are reconstruction days. Getting back to the pre-war state of things is going to take a long time.

The sooner the start is made the better.

Because of accurate workmanship through and through, *St. Louis Cars* can be maintained more economically than others. That is why they are a *better* investment.

The repair question in connection with our cars is a very trivial matter—because of their super-quality construction.

It will pay you to confer with our Engineers about new cars.

St. Louis Car Company
St. Louis, Mo.

BRAKE SHOE STANDARDS

SAVE MATERIAL

SAVE LABOR

SAVE TIME

SAVE MONEY

Ask Us?

American Brake Shoe & Foundry Co.
30 Church Street, New York
McCormick Bldg., Chicago Chattanooga, Tenn.

You Are Never in Doubt

when your road is protected by

Nachod Signals

No matter what your road conditions are, a Nachod will take care of them. There are 7 types of Nachods for all service, from high speed interurban to city travel.

Write for information.

Nachod Spells Safety.

NACHOD SIGNAL CO., Inc.
Louisville, Ky.

PACIFIC COAST REPRESENTATIVES
ECCLES & SMITH CO., Portland, Oregon, San Francisco, Cal., Los Angeles, Cal.

2234

Steel Poles
For Every Pole Purpose

Cut shows Bates Steel Poles in Electric Trolley Line service by Des Moines City Ry. Co., Des Moines, Iowa. Over 2100 Bates Poles in use in Des Moines, mostly Trolley Service and some Street and Park lighting.
Bates Steel Poles are becoming universally popular.
Repeat orders testify their general suitability for every Pole purpose, Telegraph, Telephone, Power Transmission, Electric Trolley Lines, Electric Lighting, etc. Highest class and most up-to-date steel pole equipment in the world. Our STEEL POLE TREATISE tells the story. Ask for it.
About 2,000 tons of steel constantly on hand; immediate shipments and lowest prices.
"Tubular Steel Poles cost 50 per cent. more than Bates Steel Poles, yet Bates Poles are 100 per cent. stronger — will last 100 per cent longer, cover a much broader range of adaptability and are much more artistic than Tubular Poles; ask us to verify these facts.

Bates Expanded Steel Truss Co.
208 S. La Salle St.
Chicago, Ill.
U. S. A.

Aristos "Copperweld"
Copper Clad Steel Wire

Steel for strength; Copper for conductivity; and the following advantages over solid copper wire—less weight—higher elastic limit—smaller diameter for equal work, giving less projected surface subject to wind pressure and capable of supporting sleet load—and for the same cost you get much more Copperweld than solid copper.

Drawn from the product of Copper Clad Steel Co. Pittsburgh

PAGE STEEL & WIRE CO.
Sales Offices: 30 Church St., New York
Plants: Monessen, Pa. and Adrian, Mich.
Western Representatives:
STEEL SALES CORPORATION, CHICAGO 12

1870-EUGENE F. PHILLIPS-1882 AMERICAN ELECTRICAL WORKS

WEATHERPROOF WIRE AND CABLE
PAPER INSULATED UNDERGROUND CABLE
(Single, Duplex and Three Phase)
TROLLEY WIRE
(Round, Grooved or Figure 8)
BARE COPPER WIRES AND CABLES
MAGNET WIRE
(Cotton or Asbestos)

Americanite Rubber Covered Wire
Incandescent Lamp Cord

Galvanized Iron and Steel Wire and Strand

AMERICAN ELECTRICAL WORKS
Phillipsdale, R. I.

Boston, 176 Federal; Chicago, 112 W. Adams; Cincinnati, Traction Bldg.; New York, 233 B'way; San Francisco, 612 Howard; Seattle, 100 1st Ave. So.

Aluminum Company of America

Manufacturers of

ALUMINUM

Electrical Conductors

All-Aluminum and Steel Reinforced
for
Transmission Lines
Railway and Industrial Feeders
Signal Circuits
Railway Catenary Construction
Bus Bars
also
Ingots—Rods—Rivets—Extended Shapes
Sheet Tubing
also
Aluminum Solders and Flux
Flux and Wire for Autogenous Welding

GENERAL SALES OFFICE
Oliver Bldg., Pittsburgh, Pa., U. S. A.

Canada: Northern Aluminum Co., Ltd., Toronto.
Latin America: Aluminum Co. of South America, Pittsburgh, Pa.
England: Northern Aluminium Co., Ltd., London.

Trolley Wire
Insulated Wires
Transmission Wire

Bronze and
Galvanized Steel
Contact Wire

ELECTRICAL WIRES AND CABLES

Galvanized E. B. B. and B. B. Telephone and Hard Drawn Copper, for Telephone Lines. Bronze and Galvanized Steel Contact Wire. Galvanized Strand for Guys, Span Wire and Messengers.

JOHN A. ROEBLING'S SONS COMPANY, TRENTON, N. J.
Branches: New York Boston Chicago Philadelphia Pittsburgh Cleveland Atlanta San Francisco Los Angeles Seattle Portland, Ore.

THE LINDSLEY BROTHERS CO.
Western "Good Poles Quick" Northern
Quick Shipments from our Minneapolis Yard
Rooms 832 834, 72 West. Adams St.
CHICAGO, ILL.
Spokane — St. Louis
Butt Treating Open Tank and "Hot and Cold" Processes

"NATIONAL"
TUBULAR STEEL POLES
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A positive locking switch lock that locks right and left. Waterproof, non-freezable, mud-proof and sand-proof. Simple in construction, perfect in operation and easily installed. Positively prevents split switches.
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CONSULT OUR ENGINEERS ON YOUR SIGNAL REQUIREMENTS
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Transmission Line and Special Crossing Structures, Catenary Bridges
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Your best insurance against insulator breakage
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Tell us about them

We often receive letters like that quoted below, from an electric railway company. If you have had experience with "ACMES" write us about it. If not

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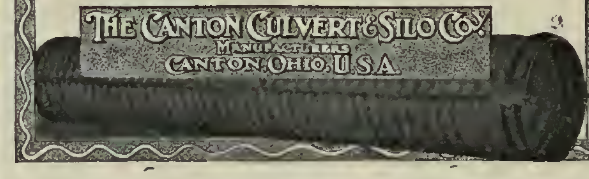

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WE MAKE THIS GRADE ONLY

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can move more material than six to eight wheelbarrows. Easily portable. Power driven. Over a thousand in use.

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Dependable Track Work for Electric Railways

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The exacting requirements of public service demand that service interruptors shall be minimized in extent and duration as much as can be. The AUTOMATIC RECLOSING CIRCUIT BREAKER.

Localizes D.C. Trouble and Restores Service —Automatically

—the instant the line is again O.K. The protection afforded by AUTOMATIC RECLOSING CIRCUIT BREAKERS is *complete* protection.

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PROTECT APPARATUS AND SERVICE

The Automatic Reclosing
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Crown
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insures maximum efficiency
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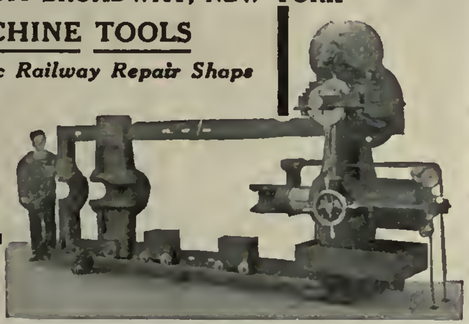

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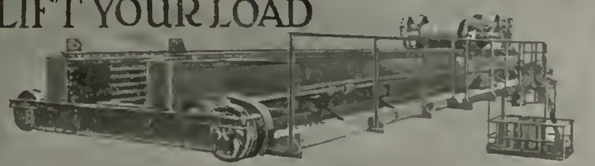

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Philadelphia Office, 2013 Market St.
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There has been no advance in price, on the contrary because of manufacturing economies our average prices are somewhat lower than prices existing prior to our entrance into the War.

If your extinguishers are empty you are taking a desperate chance. Do not flirt with possible regret any longer. Wire your order in quick. Prompt shipment guaranteed.

Castle Liquid is sold under a broad money-back guarantee

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PURIFICATION SYSTEMS
SOFTENING & FILTRATION
FOR BOILER FEED AND
ALL INDUSTRIAL USES
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Railroads-Contractors-Industries
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Templeton, Kenly & Co., Ltd.
Established 1899
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THE CUTTER ELECTRICAL AND MANUFACTURING CO.
CIRCUIT BREAKERS
I-T-E
PHILADELPHIA

I. T. E.
Circuit Breakers
for heavy street railway work are the best obtainable. Write for New Complete Catalogue.

International Specialties Cover the Entire Range of Fare Collection

Money-counting fare boxes; Coin and metal ticket-counting fare boxes; Coin registers; Coin and transfer registers; Coin, metal ticket and transfer registers; Motor-driven coin and transfer registers; Motor-driven registers for station, ferry, park and terminal use; Metal and paper registers with single hopper; Round and square registers; Transfer printers; Heeren Enamelled Badges; Punches and Bell Cord.

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A Great Improvement in Coin Changers

The McGill HIGH-SPEED Lever-operated Changer is now built with a gear movement instead of a curved cam. If desired a fifth barrel can be attached, which will meet all practical requirements of fare collections. The new machine can be supplied to eject quarters, dimes, nickels, single pennies,

or 4 or 5 pennies at one time. Also 4 nickels at a time; also metal checks for fare box service.

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HEATING CURRENT
Write for THERMOSTATIC CONTROL INFORMATION

GOLD

ELECTRIC HEATERS Cut Installation and Maintenance Charge.
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THERMOSTATS Save Current.
ORIGINATED the use of NON-CORROSIVE Wire for Electric Car Heaters.
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LET US FIGURE ON YOUR NEXT REQUIREMENTS
Gold Car Heating & Lighting Co., 17 Battery Pl., New York

Full power with
High or Lower Adjustment

Many emergencies requiring a powerful jack present a difficulty in bringing the jack to bear on the load. The

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saves time, strength and trouble. The many positions to which it is adjustable easily solve perplexing lifting problems. Full details in our catalog. Write for it.

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A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only Block that carries a five-year guarantee.

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"Everything in Insulation"

Mica
Vulcanized Fibre
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Insulating Tapes
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The above are only a few of our products
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IMPERIAL WELDING AND CUTTING EQUIPMENT
OXY-ACETYLENE PROCESS

Welds everything in metal—cuts anything in steel or wrought iron. Excels in Speed, Safety, Efficiency and Economy. Write for Free Catalog.
The Imperial Brass Mfg. Co., 575 S. Racine Ave., Chicago

"It Behooves You to Hooverize Your Motormen"

We can help you

Write to

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You will buy
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Eventually—
Why not now?

Cleveland Fare Box Co.
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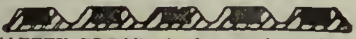

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KARBOLITH CAR FLOORING—for steel cars; is sanitary, light weight, fire proof, non-slippery.

STANWOOD STEPS—Self-cleaning, non-slippery, light.

Our products used on all leading railroads, on cars and stations. For details address:

AMERICAN MASON SAFETY TREAD CO., Lowell, Mass.
Branch Offices: Boston, New York City, Philadelphia.
Agencies in all principal cities.

Use them in your terminals—
PEREY TURNSTILES
or PASSIMETERS
Faster than the ticket seller

Perey Manufacturing Co., Inc.
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Heating and Ventilating

Let us demonstrate to you how we can heat and ventilate your cars at the lowest possible cost.

The Cooper Heater Company
Carlisle, Pa.

The Big Three
D & W Fuses, Deltabeston Wire
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Hale and Kilburn
No. 108, Concave Seat
For One-Man and Other Cars

Only four parts—Steel Aisle End Support, Steel Wall End Support, hardwood-framed Rattan Cushion and Rattan Back. Note new yokeless pedestal and concave cushion

This No. 108 seat is only ONE-HALF THE WEIGHT OF SEATS WITH IRON CASTINGS.

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Bonham Traffic Recorders
Show origin and destination of every fare collected as well as other valuable traffic data.

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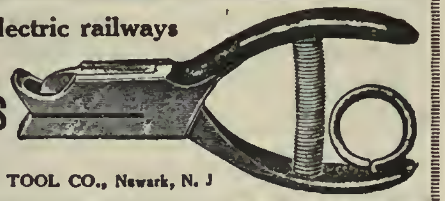
The Economy
Railway Meter
Induces
Power Saving.

Our power-saving bulletins will vitally interest you right now. Ask for them.

Economy Electric Devices Co., Chicago

75% of the electric railways
use
B-V Punches



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Car Heating and Ventilation
is one of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

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We have on hand for immediate shipment thousands of high grade Butt Welded poles—made from special high carbon skelp. Sufficiently flexible but without taking a permanent bend at 35 to 40 pound wheel pressure.

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EVERY GEAR REGISTERED

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Anderson Brake Slack Adjusters.
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Watson Car Lighting Regulator.
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V-K

Using the V-K Oilless Trolley Wheel and V-K Non-Arcing Harp saves power and insures maximum conductivity with entire freedom from interruptions of current to the pole. It leads to improved service and longer wheel mileage.

Catalog on request.

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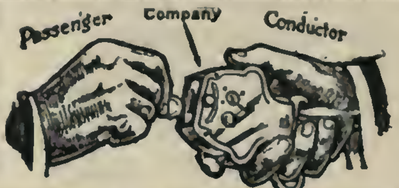
You can secure just the man you desire to strengthen your organization by placing an advertisement in the Searchlight Section.

This paper is read by progressive men, many of whom are ambitious for better positions than they now have. They study our "Positions Vacant" columns each week for opportunities for advancement.

Hundreds of prominent employers now use this method of securing the men needed in their organizations. The cost is only 5 cents a word, minimum charge $1.50 an insertion.

May we not help YOU also?

81



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By the
Passenger

Rooke Automatic Register Co.
Providence, R. I.

Electric car heaters—thermostatic control—pneumatic car door operators—buzzers, single-stroke bells, starting signal lights—special resistances.

CONSOLIDATED CAR HEATING CO.
ALBANY, NEW YORK, CHICAGO

Eight Hundred and Twenty-three Equipments of N L Indicating Taillights Sold During the Year 1918

2323 Cars now equipped and the motormen in Cleveland, Toledo, Philadelphia, Akron and St. Joseph say it is the best thing ever put on a car to promote safety and economy.

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are made for every condition and requirement. M. C. B. Pin and Link, Car and Air, in all sizes and types.

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"Boyerized" Products Reduce Maintenance

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Case Hardened Nuts and Bolts
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Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

Bemis Car Truck Co., Springfield, Mass.

"Trade Mark Reg. U. S. Pat. Off."

Samson Spot Waterproof Trolley Cord

Made of fine cotton yarn braided hard and smooth. Inspected and guaranteed free from flaws. Proved to be the most durable and economical. Samples and information gladly sent.

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NOW! NOW! NOW!

Now is the time to sell machinery and material to the industries curtailed during war time. Equipment offered *now*, gets the benefit of present market prices and *immediate* demands.

You can reach the big buyers in the electric railway field through

The Searchlight Section
of
Electric Railway Journal

"Searchlight" advertising is the big factor of recent years in the sale and exchange of used machinery. Buyers and sellers use it to equally good advantage:

During war times it helped both government departments and private buyers to obtain necessary equipment; it enabled one advertiser to sell $4,800 worth of machinery through advertising that cost $12; another sold equipment for double the price he expected to get for it; another sold equipment through "Searchlight" advertising in less than a month, that has already been offered through other channels for over 8 months.

If YOU have surplus equipment on hand, NOW is the time to sell it—through the "Searchlight."

SEARCHLIGHT
SERVICE
SECURES
SATISFACTORY
SALES

SEARCHLIGHT SECTION

POSITIONS VACANT

AN energetic, capable working foreman wanted to take charge of rolling stock and overhead construction of small electric railway in Illinois. Must be a thorough electrician and have the judgment to use labor and material efficiently. Salary, $150 per month. Give experience, references, date can report, and photo with first letter. Address P-324, Elec. Ry. Journal, Chicago.

POSITIONS WANTED

GENERAL superintendent of city and interurban railway desires position in city of over 50,000. Present location too small. Highest recommendations from past and present employers. PW-318, Elec. Ry. Journal, Chicago.

STEWARD—Practical and economical experienced in manufacturing and construction plants, desires similar position. Reliable testimonials supplied. Address Steward, PW-323, Elec. Ry. Journal.

SUPERINTENDENT or manager of electric railway, technically trained, 40 years of age, 14 years experience, construction, operation, engineering and appraisal. Good executive, successful with men. Not afraid of work. Now employed supt. of complete operation. Will let results tell the story. PW-311, Elec. Ry Journal, Chicago.

WANTED

FIRST-CLASS ARMATURE WINDER

Excellent position for capable man. Chance for advancement. One of the best equipped shops in New England.

P321—Elec. Ry. Journal
10th Ave. at 36th St., New York City

SALES MANAGER

with several years' experience in handling high-priced interurban and street railway equipment wants a position as Sales Manager or as Salesman in territory where such experience is required. Has also had shop and office training. Has position. Change desired for personal reasons.

A8322—Electric Railway Journal
935 Real Estate Trust Bldg., Philadelphia, Pa.

RAILS

850 tons 100-lb. New.
900 tons 90-lb. New.
750 tons 85-lb. New.
50 tons 80-lb. New.
And Angles.
8—70-lb. ASCE turnouts, Manganese tongue switch, solid Manganese Frog.
1—(60-lb. ARA-A4½ in.) left-hand turnout tongue switch Mate Frog, used, good as new.
2000—New 70-lb. pressed steel Rail braces.
600 Kegs "Zelnicker Selected" used ⅝ x 5½-in. Track Spikes.
500 Kegs New ⅝ x 5 & 5½-in. Spikes.
Angle Bars, Track Bolts, Tie Plates.

All for prompt shipment.

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Send for Bulletin 250 (100,000 Circulation—88 pages). Cars Locomotives, Machinery, Tanks, Piling, etc.

In Replying to "Blind" Ads

be careful to put on envelope the key number in the ad. and also local address of office to which reply is sent.

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1570 Old Colony Bldg., Chicago.
519 Newhouse Bldg., Salt Lake City.
501 Rialto Bldg., San Francisco.

Important

Original letters of recommendation or other papers of value should not be enclosed to unknown correspondents—send copies.

Cars For Sale

12 Double Truck Motor or Trailers. Brill 27-F trucks, 28-ft. closed bodies.

3 SNOW PLOWS

2 single, 1 double truck

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

FIRST Get Bulletin 250—or, Wire

ZELNICKER IN ST. LOUIS

Before buying or selling

RAILS

Locomotives—Cars—Tanks
Machinery, Piling, etc.
What have you for sale?

35 Tons

7-in. Girder Rails

P. S. Co. Section No. 238

HENRY LEVIS & CO.
Commercial Trust Bldg., Philadelphia, Pa.

ELECTRIC RAILROAD

FOR SALE

Pursuant to order of the Court of Common Pleas, I will offer the Columbus, Magnetic Springs & Northern Railway for sale as a scrap proposition at

10 A.M. JANUARY 15th, 1919

Place of sale will be Delaware, Ohio, at the Court House. It will be offered first as a going concern, and then as a whole to be dismantled. The road ceased to operate December 31, 1918.

There are over 1650 tons of No. 60 and No. 70 pound rails ASCE section which have seen but very little use; more than 45 tons of 40 insulated and 2/0 trolley. Power Plant in good condition with one Corliss engine 250 hp., 2 Stirling Boilers 150 hp. each, 1 G. E. Generator 300 kw., 2 Passenger Cars, 1 Electric Mule, 1 Baggage Car. Bridges aggregate about 250 tons. Right of way is owned in fee simple, and 10 acres of land in one parcel adjacent to the City of Delaware. Car Barn and Station at Richwood, Ohio; Power House and Dwelling House on the line, also shop tools and machinery, office furniture, track tools for three gangs, several carloads of miscellaneous scrap, power plant machinery, mast arms, copper bonds, trolley blades, spikes, rails and fastenings, miscellaneous material and supplies, 2 carloads of coal and other appurtenances. Length of line 16½ miles.

CHAS. J. FINGER, *Receiver*
Allen Hotel, Delaware, Ohio

RATES:

1 inch—$3.00
4 inches—2.90 an inch

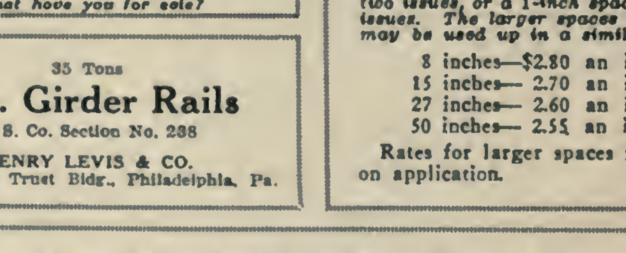
(The above rate applies to a 4-inch space in one issue, a 2-inch space in two issues, or a 1-inch space in four issues. The larger spaces following may be used up in a similar way.)

8 inches—$2.80 an inch
15 inches—2.70 an inch
27 inches—2.60 an inch
50 inches—2.55 an inch

Rates for larger spaces furnished on application.

WE OWN AND OFFER FOR SALE

A Real Bargain



Used McKeen Motor Passenger Car

All steel construction in first-class condition. Seating capacity 71.

For further information write or wire

Hyman-Michaels Co., People's Gas Bldg., Chicago. Phone, Harrison 1100

Fare Registers

FOR SALE

One lot—Sterling No. 5
One lot—Sterling No. 12
One lot—Sterling No. 15

Above in condition equal to new.

One lot—New Haven Round Single
One lot—New Haven Square
One lot—Sterling No. 1
One lot—Meaker-1894 Model
One lot—Security (St. Louis)
One lot—Lewis and Fowler
One lot—Square Recording

All above in first class condition.

Repair Parts for Registers.

Repairing at Short Notice.

EXELL MANUFACTURING CO.
NEW HAVEN, CONN.

10,000 Kw.
Turbo-Generator Unit

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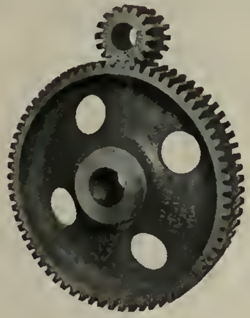

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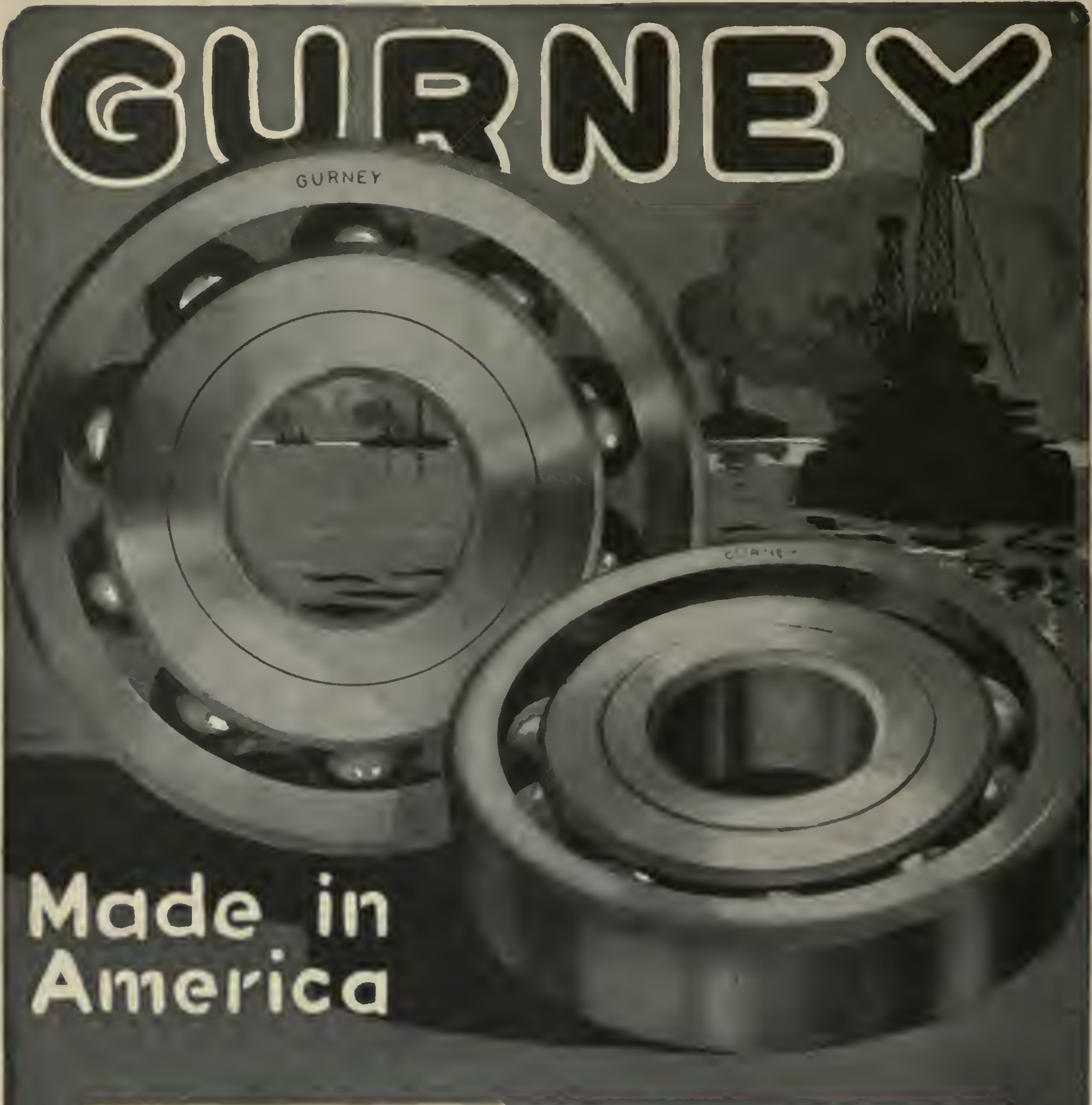

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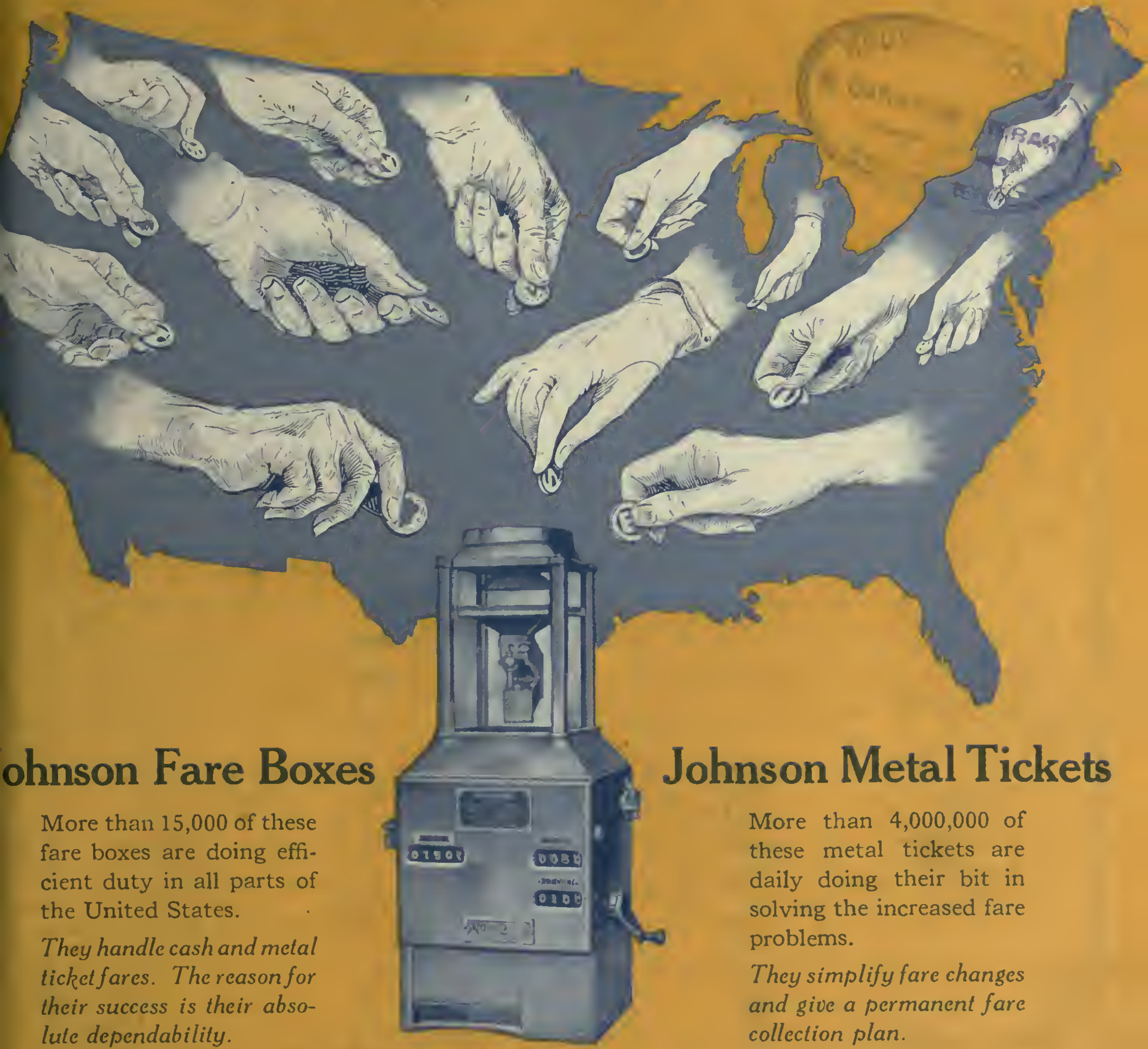

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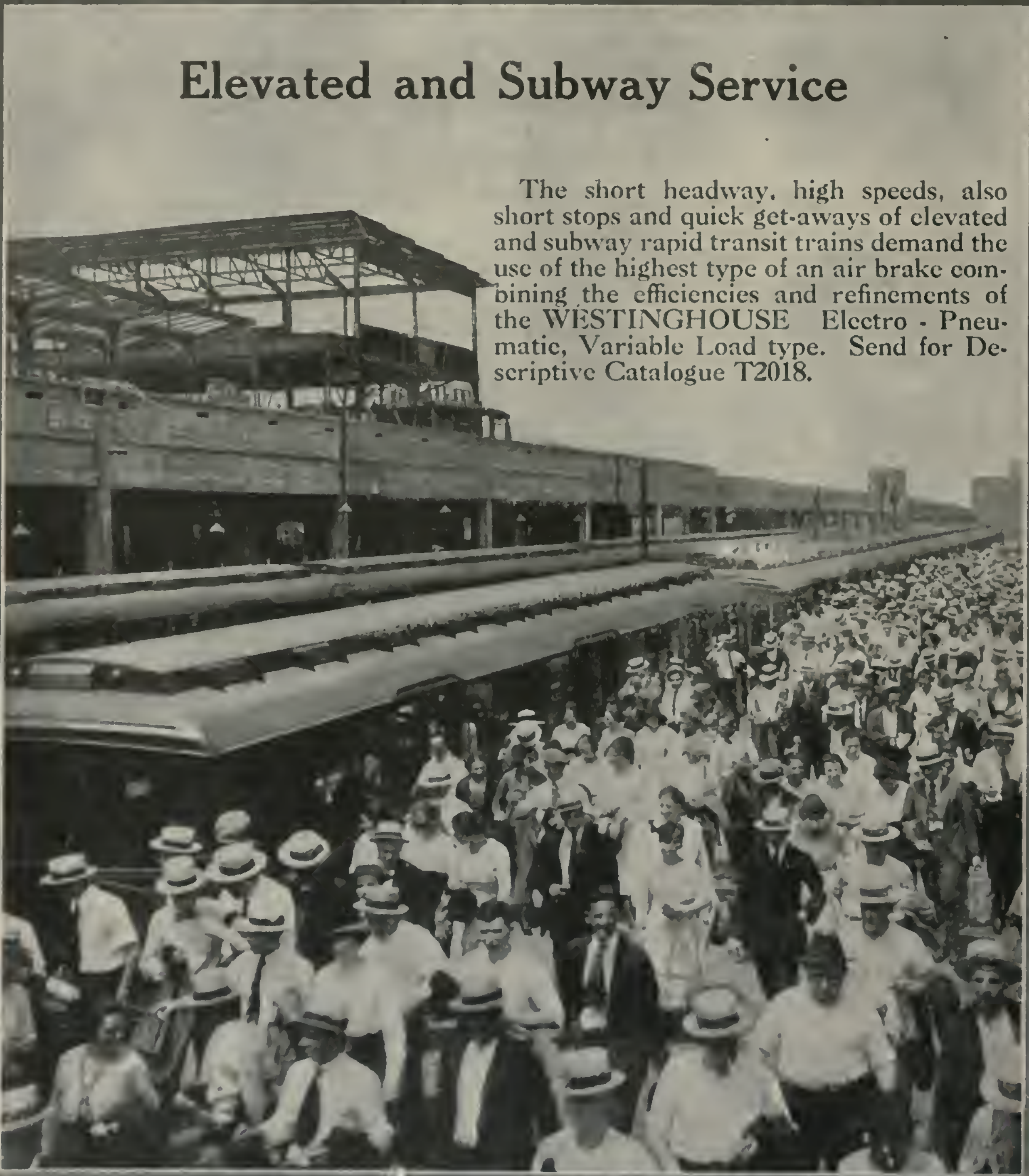

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The short headway, high speeds, also short stops and quick get-aways of elevated and subway rapid transit trains demand the use of the highest type of an air brake combining the efficiencies and refinements of the WESTINGHOUSE Electro - Pneumatic, Variable Load type. Send for Descriptive Catalogue T2018.

Brake Building our Business for a Lifetime.

Westinghouse Traction Brake Company

General Offices and Works, Wilmerding, Pa.

Atlanta, Ga.
Boston, Mass.
Chicago, Ill.
Columbus, O.

Denver, Col.
Houston, Tex.
Los Angeles, Cal.

Mexico City
New York, N. Y.
Pittsburgh, Pa.

San Francisco
Seattle, Wash.
St. Louis, Mo.
St. Paul, Minn.

POINTERS FOR POWERHOUSE MEN

Taken from Circular 2032 "Fuel Saving Suggestions"–

—The first thing to do in any plant, anywhere, whether you have stokers or not, is to keep the boiler heating surfaces free from soot, scale or oil.

—Keep the fires level and free from blow holes.

—Don't keep the fires so thin that excess air will be drawn in.

—Don't carry the fires so thick that incomplete combustion will result.

—Don't soak the coal with water before firing.

—Be sure the blow-off valves do not leak.

—Don't have the safety valves popping off continually.

—Cover steam pipes.

—Don't waste steam through leaky valves or traps.

—Never use live steam if exhaust steam is available and can be used as well.

—Give your fireman an opportunity to acquire the fundamentals of fuel burning.

—If you have a difficult fuel problem, consult a combustion engineer.

—Use gages to indicate exactly the condition of fire bed at all times. As a minimum, these gages should consist of draft gage indicating draft in furnace above fuel bed, draft gage indicating draft at boiler side of flue damper, and a steam flow meter for individual boilers.

—CO_2 is the principal product of complete combustion of coal; 10 to 12% CO_2 should be obtained in flue gases to insure minimum fuel loss.

—Don't permit grates to clog. A systematic method of keeping air space clean should be followed.

—Inspect baffles in boilers, as broken or leaky baffles mean high flue gas temperatures and waste coal.

—Prevent cold air leaking in around boiler setting.

—Clean scale from tubes. Every particle of scale represents wasted coal.

—Avoid soot formation. All boiler tubes should be blown externally once every eight hours when in continuous service.

—Locate dampers in front of boilers so fireman will adjust them as required.

Write for Circular 2032

Westinghouse Electric &
Mfg. Co.
East Pittsburgh, Pa.

W
WESTINGHOUSE ELECTRIC

With high combustion efficiency and an overload capacity of from 200 to 300%,— the Westinghouse Underfeed Stoker does away with idle equipment, the spare boilers, and the banked fires—which are so wasteful of fuel.

Westinghouse

What the Safety Car is Doing at Tampa, Fla.

Population served 38,000

ON the Michigan-Hyde Park Line, a through cross-town route, 12.2 miles round trip, Safety Cars increased the schedule speed 0.6 of a mile per hour.

Saving in Man Power, 33 1/3%.

Saving in Power Bill (Est.), 50%.

Increase in Gross (Lowest Estimate) 20%.

"Our Air Brake and Safety Car Control Equipment made possible and established for the Tampa Electric Company the results above stated."

Why wait when such results are possible?

SAFETY CAR DEVICES CO.

Main Office—Boatmen's Bank Bldg., ST. LOUIS, MO.

CHICAGO
Railway Exchange Bldg.

NEW YORK
City Invest. Bldg.

PITTSBURGH
Westinghouse Building

CANADA—Canadian Westinghouse Co., Ltd., Hamilton, Ont.

O-B PRODUCTS

Quality First

O-B Form 1 Trolley Base—Patented.

O-B Bases Complete—Balanced

There is not a single excess pound of weight in the O-B Trolley Base. Experience has proved that it is as light as an efficient, durable base can be made.

These are the features that make it valuable: Practically uniform pressure on the trolley wire at all angles of pole.

Roller bearing which cannot jam. Base swings freely on large area bearing.

Plentiful current carrying capacity.

Readily accessible for inspection of all parts.

Renewable steel bushings at all points of wear. O-B Base stays new.

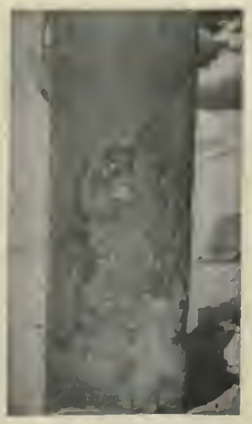
Many a road has taken O-B Base on trial and then sent in order after order for this Complete Base.

Try an O-B Base on your cars at our expense.

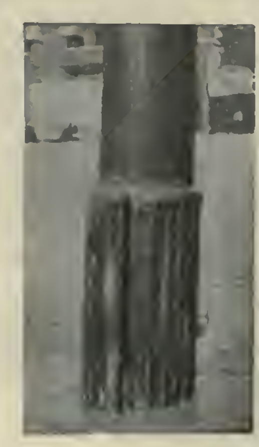
THE OHIO BRASS CO., Mansfield, Ohio

New York Chicago Pittsburgh Philadelphia San Francisco Los Angeles

Speaking of Rejuvenation!



Base of pole after 7 years service



Good for 20 years more!

The work of the

DREW POLE SLEEVE

"Rejuvenation" is perhaps the biggest word in the Electric Railway field today. Here is a concrete instance that should set you *thinking*. The difference in cost between replacing and rejuvenating a 1500 lb. pole is about $51—in favor of the DREW Sleeve. This is not counting the difference between the probable life of the replaced and renewed poles—not less than 10 years!

The economy that Drew makes possible in regard to the POLE is reflected in the DREW Line Material that should go with it. Read this up in our Catalog. Send for *your* copy.

Drew Electric & Mfg. Company

1016 E. Michigan St., Indianapolis, Ind.

District Representatives:

Holden & White, Inc., 343 S. Dearborn St., Chicago, Ill. Brown & Hall Supply Co., 1515 Pine St., St. Louis, Mo. Railroad Signal Supply Co., Hackney Bldg., St. Paul, Minn. Wm. F. McKinney, 54 First St., Portland, Ore. Frank F. Bodler, 903 Monadnock Bldg., San Francisco, Cal. Engineering & General Supply Co., 400 San Fernando Bldg., Los Angeles, Cal. Alfred Connor, Majestic Bldg., Denver, Colo. Wm M. Lawyer, 383 Fayette St., Syracuse, N. Y. Goldschmidt & Forbes, Inc., 90 West St., New York, N. Y. H. S. Salt (Export Agent), 114 Liberty St., New York, N. Y.

Canadian Representative: Northern Electric Co., Ltd., 121 Shearer St., Montreal, Que.

DREW
MEANS "SERVICE EFFICIENCY"

INTERNATIONAL

STEEL TWIN TIES

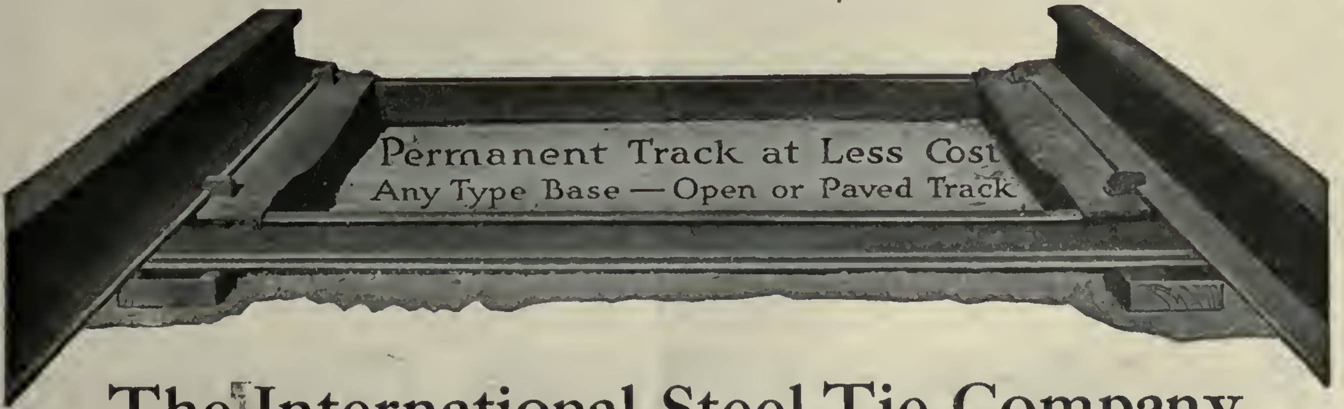
Afford a More Substantial Foundation for Paving

In laying International Steel Twin Ties, the ties become an integral part of the concrete road bed. *They reinforce it.* Any concrete engineer will tell you of the vital necessity for adequate reinforcement in concrete for an even distribution of loads.

On the other hand, wooden tie construction often disturbs the uniformity of the concrete. Wood ties offer no real, scientific form of concrete reinforcement. In fact, by their wear, they not infrequently result in depressions, which are aggravated by traffic.

International Steel Twin Ties not only insure uniformity in your paving, but *better track at less cost.* The concrete bed can safely be reduced to seven inches thickness, which is *adequate* (thanks to the reinforcing) and which is *resilient* to a degree not found in other forms of construction. This resiliency results in better service from both ties and track. Also, it is easier to *remove* 7 inches as compared to 12 inches of concrete.

This is just one of the many angles of International Steel Twin Tie Superiority. Investigate the others—**ask us to set all the facts before you.**


Permanent Track at Less Cost
Any Type Base — Open or Paved Track

The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

General Sales Office and Works: Cleveland, Ohio

Phono-Electric

The Breakless Trolley Wire

The Puget Sound Electric Railway, Light & Power Company began to put up No. 00 round Phono-Electric Trolley Wire on curves as early as 1911.

Although Phono-Electric was put up at the hardest-wear places, only one break has been reported in six years—

And that break was found to be due to a faulty splice!

Users of Phono-Electric do not hesitate to refer to it as "The Breakless Trolley Wire."

Bridgeport Brass Company
Bridgeport Connecticut

2064

PROTECTED RAIL BONDS

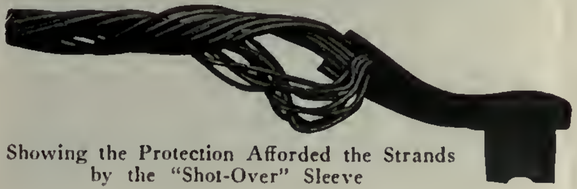
Primarily your rail bonds must assure a return circuit of maximum electrical conductivity.

This track illustrated is bonded with "Protected" Rail Bonds.

They are specially designed to everlastingly perform this duty, because—

They have "Shot-Over" Sleeves which protect the strands from the effects of vibration where they emerge from the terminal.

They have many strands of pure lake copper which further help to absorb vibration.



Showing the Protection Afforded the Strands by the "Shot-Over" Sleeve

They have lugs of soft, pure, ductile copper which, as you know, is best for compressing into the rail.

They form a broad line of bonds for every service.

Always use "Protected" Bonds.

Write for Catalog.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Streets

PITTSBURGH
337 Oliver Building

NEW YORK
50 Church Street

CHICAGO
Monadnock Building

These Raceways Do Not Pit Nor Wear

This is one of the chief points of superiority in the Hartman centering center plate. The large diameter balls, 2⅛ inches, carry the load over such an area of the raceway that pitting and wearing is prevented.

Thus a line contact is provided instead of a point. And these balls do not wear and will not crush.

This statement is proven by over 200,000 Hartman bearings in service on electric and steam railway cars. 72% of our monthly orders come from electric railways for installation on additional cars after test on partial equipment.

Holden & White Inc.

Electric Railway Distributors for The Joliet Railway Supply Company

817 Fisher Bldg., Chicago

National Rwy. Appliance Co., New York, Washington; W. M. McClintock, St. Paul; Alfred Connor, Denver; C. E. A. Carr, Toronto; F. F. Bodler, San Francisco; S. I. Walles, Los Angeles; W. F. McKenney, Portland; L. Brandenburger, Salt Lake City.

See Page 11

of our Perry Hartman Bearing catalog for complete description of this device and how it can be applied to OLD CARS. Copy free on request.

Hartman
Centering Center Plate

Elreco Combination Poles

for Combination Trolley and Light Service

Will Last a Lifetime

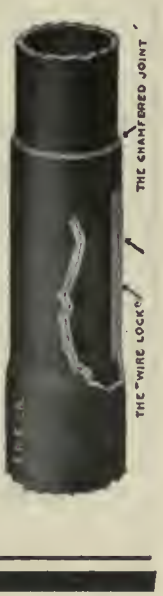
There are hundreds of Elreco Combination Poles in the City of Pittsburgh.

The use of Elreco Combination Poles was a happy joint solution of the railway and the lighting problem; for the same poles which carry the trolley span-wires also support the lighting fixtures. Separate lamp standards which would obstruct the curb line. are not needed, and their first cost and installation cost is saved.

Elreco Combination Poles are strong and durable. They will last a lifetime.

Ask for Further Information

Electric Railway Equipment Co.
Cincinnati, Ohio
New York Office: 30 Church St.



65% reduction in fuel cost results from the use of kerosene in Mudge Cars. Operate with equal efficiency on kerosene or gasoline.

MUDGE
MOTOR CARS
for Electric Railway Service

Everyday use of Mudge Motor Cars proves that they are safe, strong, reliable and economical, and that they meet the most exacting requirements of electric railway service efficiently.

They are built in a variety of types and sizes, each having the many Mudge patented features of safety, convenience and operation.

Whether for inspection or crew transportation, emergency work or regular service, there is always a Mudge Car which will fill the bill absolutely.

It has been found that Mudge Section Motor Cars actually save an hour a man per day in service on interurban lines.

On the strength of this feature alone it can readily be seen that Mudge cars quickly pay for themselves.

We are railway motor car specialists.

Complete Catalog on Request.

Mudge & Company

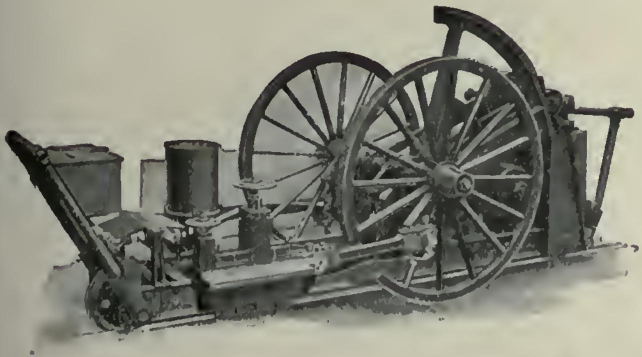
Railroad Motor Car Specialists

467 Railway Exchange, Chicago, Ill.

The Inevitable Result

and

The Preventive



To neglect the grinding out of incipient corrugations and cupped spots in rails is just as certain to lead to bad track conditions and comparatively early replacement as the neglect of rust on an exposed steel structure is certain to lead to early destruction of the structure.

We all know that the periodic scraping and painting of the steel in bridges, viaducts and similar structures prolongs the life of the material and eventually saves a lot of money.

We know that wood or timber exposed to the weather requires regular painting to protect it from decay, and such painting is also an eventual saving.

It must be at least equally clear that neglected bad spots in rails will go from bad to worse under the impact of rolling stock and that the regular use of a

RECIPROCATING TRACK GRINDER

to remove such bad spots is an eventual saving.

The profits and economies in the painting of structural materials, however, important and valuable as they are, are achieved only after a period of time by reason of the lengthening of the useful life of the material.

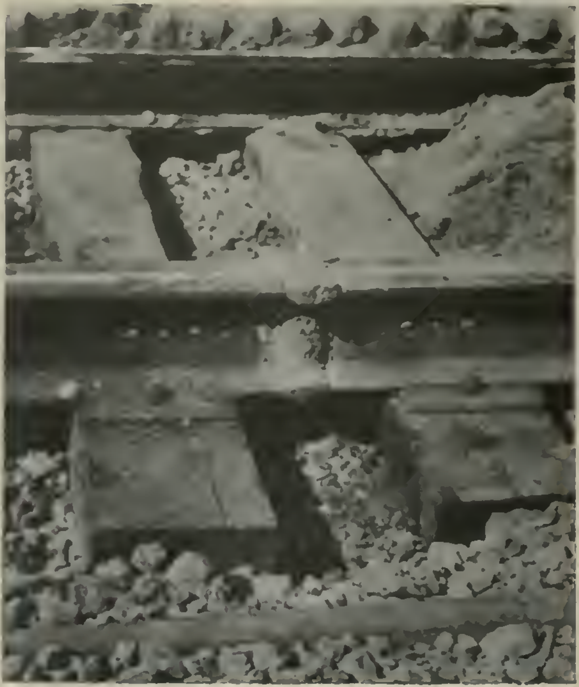
The savings developed by the use of the Reciprocating Grinder also pay handsomely after a period of years by prolonging the useful life of track *and in addition* pay an excellent continuous return in the decreased cost of track and car maintenance by removing one of the most prolific *causes* of damage to track foundation, loosening of bolts and joints, and injury to car equipment, wheels and tracks.

The use of Reciprocating Grinders pays a *continuous* as well as an eventual profit.

Railway Track-work Company

30th and Walnut Streets, PHILADELPHIA

Pre-heating the rails previous to welding



Thermit insert weld before grinding

Thermit Insert Welds

executed by the Pittsburgh Railways Co.

Thermit Insert Welds are making up for the scarcity of plates and bonds, for the Pittsburgh Railways Company, at McKees Rocks, Pa. All the joints on a stretch of track relaid by them are welded by the Thermit Insert Process. The work on this track might have been seriously delayed had it not been possible to weld the joints by the Thermit Insert Process. We said "weld" the joints—but a better expression would have been "*obliterate*" for that is what the Thermit process accomplishes. The rail-union is 100% efficient, mechanically and electrically. In many cases, these welds eliminate the necessity of relaying old track with new rails—and it is the ONLY process whereby a not-too-battered rail joint can be repaired without cutting in a new piece of rail and making two joints in place of one. And Thermit Welds *hold*.

Allow us to send Catalog 1232*—or a representative to go into details with you.*

METAL & THERMIT CORPORATION

Successors to Goldschmidt Detinning Co. and the Goldschmidt Thermit Co.

120 BROADWAY, NEW YORK

329-333 Folsom St., San Francisco
7300 So. Chicago Ave., Chicago

15 Emily St., Toronto, Ont.
1427-1429 Western Ave., Pittsburgh, Pa.

Factories located at Chrome, N. J.; Wyandotte, Mich.; East Chicago, Ind.; Jersey City, N. J.

Abbott Rail-Joint Plates

make joints the strongest part of the track

AS an independent part, the Abbott Plate can be *and is* made harder, stronger and more elastic than the splice bars.

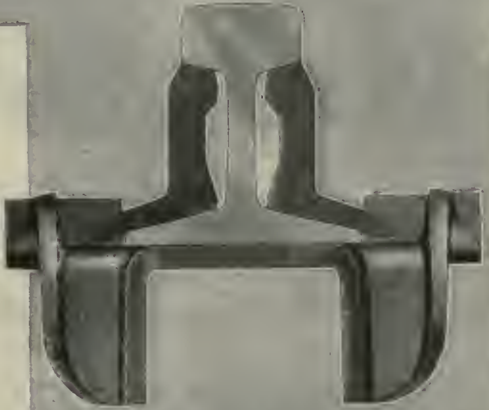
A slight camber, at its center, together with the high resilience of the axle steel we use, brings the rail ends to bear first, until as the wheel load approaches, the plate depresses into a full flat bearing with the rail bases and gives them the solid support of the two joint ties.

The strength and efficiency of this plate must be evident from the pictures. The combination of reversed flanging with 3-inch vertical depth of metal under the rail ends provides for internal stresses and brings the wheel load upon the joint ties in the same manner as the load on a short deck bridge is distributed upon its piers.

Service records demonstrate that Abbott Joint Plates will repay the cost of their installation during the first year by the saving in maintenance labor, at the same time make smooth running track surface, prevent the rail ends from battering, splice bars from bending or wearing, bolts from stretching; also will act as anti-creepers, and rail end guides, affording temporary protection where splice bars become loose.

Ask for our booklet
"Improved Track Appliances"

28S



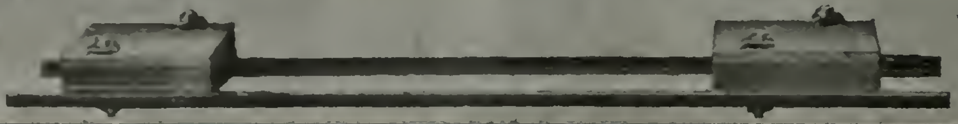
The ABBOTT RAIL JOINT PLATE
"BUILT LIKE A BRIDGE"

Lackawanna Steel Company

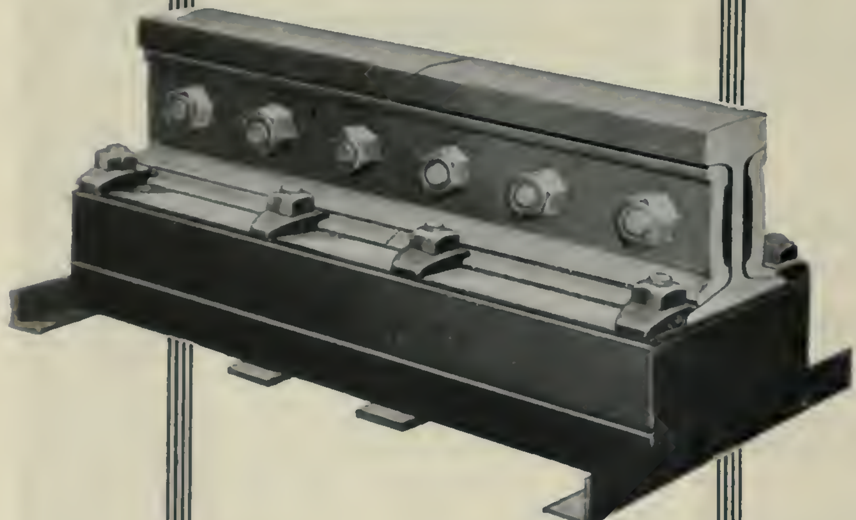
LACKAWANNA, N. Y.

ATLANTA	CHICAGO	DETROIT	ST. LOUIS
BOSTON	CINCINNATI	NEW YORK	SAN FRANCISCO
BUFFALO	CLEVELAND	PHILADELPHIA	HAVANA

The MECHANICAL RAILWAY TIE



No More Low or Uneven Rail Joints



The Dayton Rail Joint Booster automatically corrects low or uneven rail joints quickly and permanently at very slight cost and without the least interruption to schedules.

It is a specialized development of the principle which has made the Dayton Mechanical Tie so successful.

When a low joint develops, all that is required is the excavation of the track bed surrounding the joint to a depth of 13 or 14 inches below the rail base. The old ties are then cut in two and the ends supporting the joint taken out. The Rail Joint Booster is clamped into place under the rails and welded its full length, the bolts are drawn up and the rail jacked up to the correct level, the excavation tamped full of slightly damp concrete, and the pavement replaced. The cupped ends of the rails are then built up and ground to surface. Briefly, that's all there is to it!

DAYTON
Rail Joint Booster

Write or wire for full particulars

THE DAYTON MECHANICAL TIE CO.
201 Third Street Arcade
DAYTON, OHIO

National Pneumatic Second-Saving Specialties Essential for Best Train Operation

There is no worth-while economy in surface car train operation unless the increased number of stops made and passengers carried are set off by faster handling of the passenger and prompter transmission of the starting signals. These necessary savings in time are obtained to the greatest possible degree only with

National Pneumatic Door and Step Control

For the quick, positive, laborless operation of doors and steps.

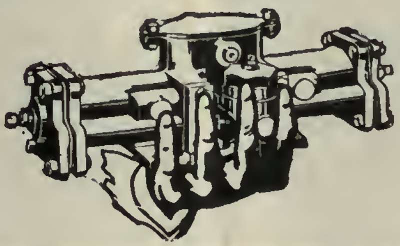
National Pneumatic Interlocking Safety Door Control

For the absolute prevention of the platform accident.

National Pneumatic Motorman's Signal Lights

For the immediate starting of the car after the doors are closed.

We shall be glad to furnish full particulars at any time.



NATIONAL PNEUMATIC COMPANY
INC.

50 Church St. New York
515 Laflin St. Chicago

TODAY!

When the renewal of your subscription to Electric Railway Journal falls due—whether March 1st or December 31st next—the price of a year's service will be four dollars. Today the price of that service is three dollars.

Not only do we wish to retain on our list every one of our old subscribers, but we sincerely wish to afford every one the opportunity of renewing at the present rate of three dollars.

The $4 rate goes into effect SOON.

Renew NOW—and your subscription will be extended, at the $3 price, for one year beyond its present expiration date, whenever that may be.

New subscriptions will also be received at the present $3 rate, if placed before the advanced rate goes into effect. The dollar is worth saving. The necessity for QUICK ACTION is urgent.

Tear off this Coupon

McGraw-Hill Co., Inc., 10th Ave. at 36th St., New York.

Renew my subscription to ELECTRIC RAILWAY JOURNAL for one year beyond its present expiration date. I will remit $3 in 30 days. It is my understanding that this request will not be accepted if mailed after the new price goes into effect.

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MAIL THIS COUPON TODAY

AD-2

and get it in the mail NOW

TODAY it is $3.
(In Canada, $4.50; foreign, $6)

SOON it will be $4.
(In Canada, $5.50; foreign, $7)

"I do not believe there was ever printed in the English language a more comprehensive set of books"

Free Examination Coupon

McGraw-Hill Book Co., Inc.
239 West 39th Street, New York

Gentlemen: Please send me the Library of Practical Electricity (shipping charges prepaid) for 10 days' free examination. If satisfactory, I will send $2 in ten days and $2 per month until $16 been paid. If not wanted I will write you for return shipping instructions.

Name ....
Home Address ....
City and State....................
Where Employed ....
....
Occupation ....
....

E 1-18-19

Croft's Library of Practical Electricity, a set of books that actually teaches electricity as in practice. A set of books that is rightfully accepted as the standard study course on electricity in America.

"In an attempt to express myself about Croft's Library of Practical Electricity, I have never seen and do not believe there was ever printed in the English language, a better and more comprehensive set of books. It is a library that is just as valuable to the novice as to the expert, because it is all practice," writes Guy H. Peifer, Chief, Doplan Silk Corporation, Hazleton, Pa.

That is probably one of the strongest statements ever made about any set of books on electricity, and it is only one of thousands of similar statements made by electrical workers throughout America.

In these days of books and books, a library on electricity must possess many merits before it can be classed as "better" or "most comprehensive." It must be clear, it must be complete, it must be written in accordance with actual practice.

The live electrical worker can no longer depend upon old, amateurish or "technical" books. With their aid he is hampered instead of helped. No one knows this better than Terrell Croft, author of the Library of Practical Electricity. Terrell Croft got his electrical education with his sleeves rolled up. He started at the bottom of the ladder, and after being chief draftsman for the New York and New Jersey Telephone Company and electrical engineer for the Westinghouse Company, he is today looked upon as one of the leading authorities on electrical practice in America.

His library takes you into every step of his advancement. Years of tinkering, experimenting and guessing are saved to those who take up the study of this library. "Does it cover my problems as well as the problems that Croft had to contend with?" Yes, every man's problems are figured out in advance for him.

If you do not order Croft's Library now, you will later. Why not order now, when it is so very convenient for you to do so. Just fill out the coupon attached and mail to us. Nothing to pay in advance. Nothing to pay at any time unless you are satisfied. Every cent of transportation is borne by us. Only $2 per month for eight months if you are satisfied.

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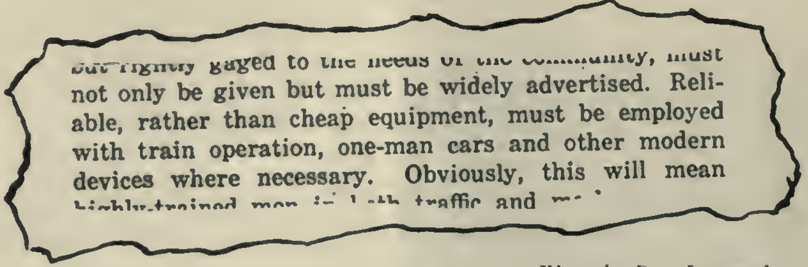
239 West 39th Street, New York
Publishers of Books for Electric Railway Journal

Reliability
Rather than Cheapness!



gaged to the needs of the community, must not only be given but must be widely advertised. Reliable, rather than cheap equipment, must be employed with train operation, one-man cars and other modern devices where necessary. Obviously, this will mean traffic and

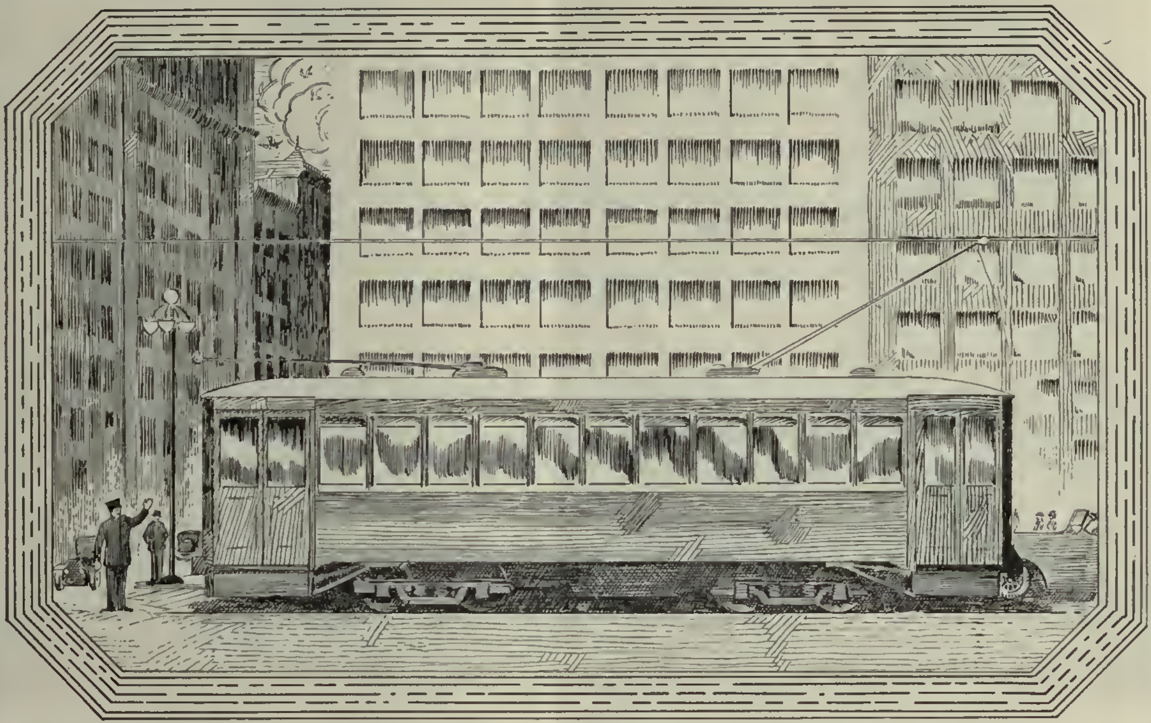
Electric Ry. Journal.

This excerpt from an article by an *authority* in the Electric Railway field strikes a *keynote.* You can afford no better than the best in the matter of preventing power losses or damage from unleashed current —and service has proven that the best insulation is

IRVINGTON
Insulation

It proved this by its service to the Government throughout the war and to the Electric Railway field prior to and during that period. Chief among our products is our BLACK VARNISHED CAMBRIC. We make oiled silk, flexible varnished tubing, special paper for coil windings and yellow varnished cambric. All of high resistance, high dielectric strength, non-hygroscopic, heat resisting and chemically neutral. Samples and further data on request.

IRVINGTON VARNISH & INSULATOR Co.
Irvington, New Jersey.



Endurance—The Big Test of Quality

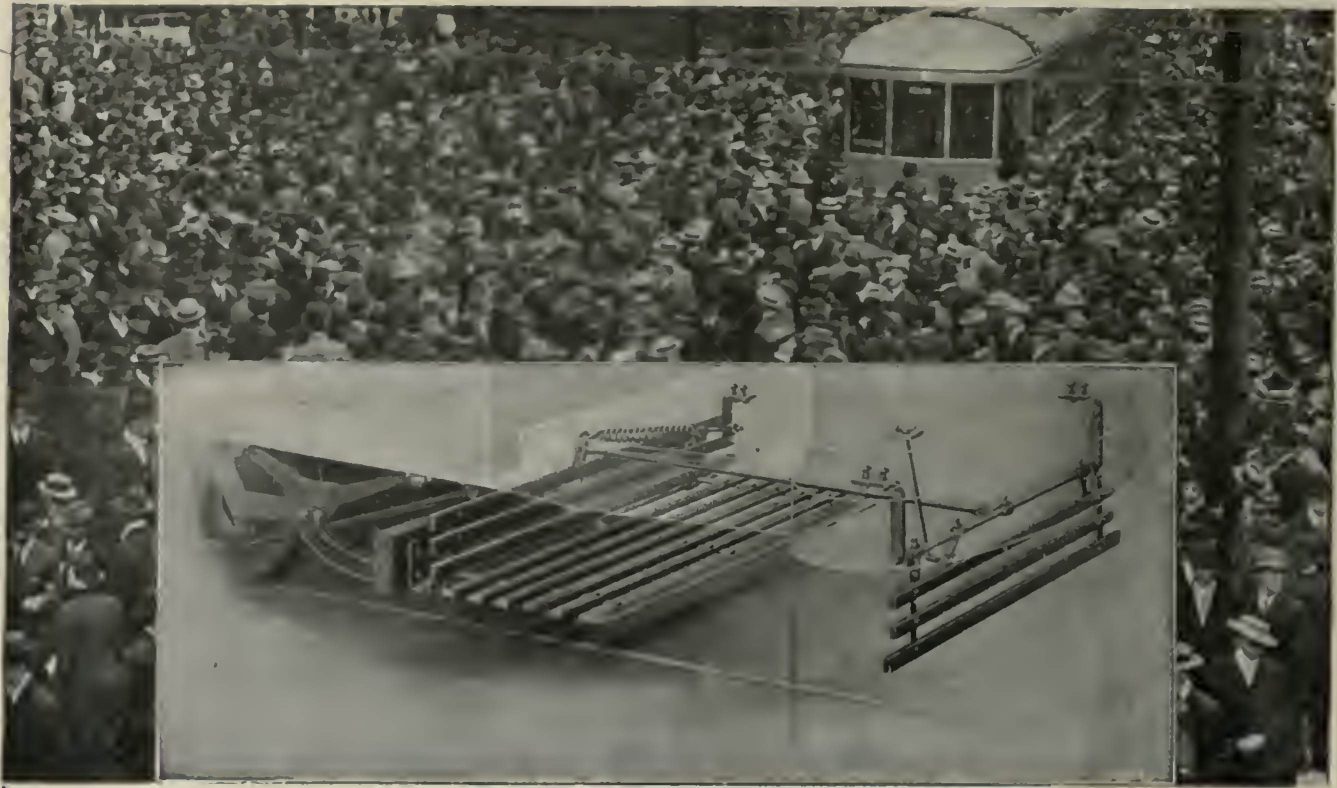
The wheels of the electric railway car must endure the stress and strain of high speed and heavy haulage; the sudden shocks from brake-shoes, track curvatures and cross-overs.

Davis One-Wear Steel Wheels

are designed and built for endurance and have proved equal to the Big Test.

American Steel Foundries
1100 McCormick Building, Chicago

ASF



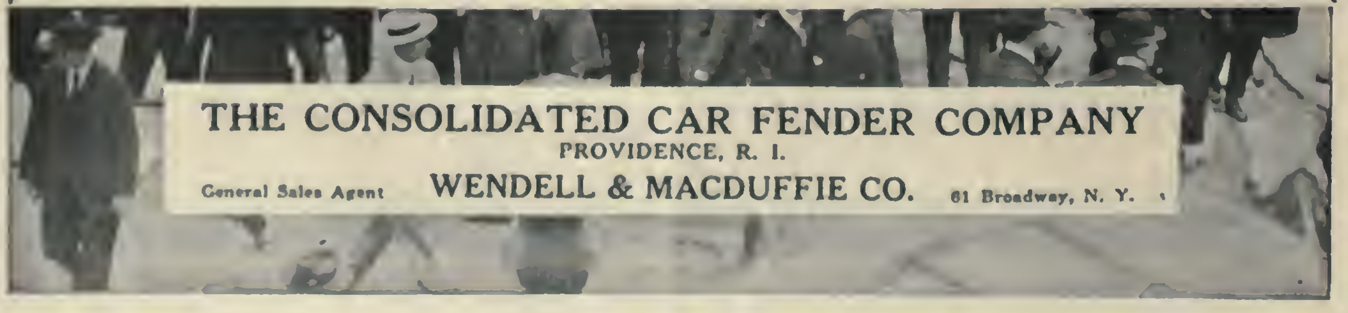
Suppose Someone Should Slip

When *your* cars must bore through traffic like this—or any dense traffic—what happens if someone should fall in front of them?

H-B Life Guards

Insure Protection

Automatically! Instantaneously! Thoroughly! They interpose a *barrier of safety* between the heavy car wheels and the body of the fallen pedestrian. They never fail, being independent of human operation. *You cannot afford damage claims now.*



THE CONSOLIDATED CAR FENDER COMPANY
PROVIDENCE, R. I.
General Sales Agent WENDELL & MACDUFFIE CO. 61 Broadway, N. Y.

Sir Goldsworthy Gurney built a steam carriage in 1828 that seemed to bear out the most optimistic hopes of early inventors. For four months, four times a day, this carriage made its nine mile trips in less than 50 minutes without an accident. Its career was brought to an end and the development of steam carriages practically killed when, due to the malicious plotting of the enemies of progress, the "Turnpike Act" became a law.

This act made the profitable operation of steam carriages practically impossible because it so restricted their speed on public highways.

The Railroad Reared Its Head from the Steam Carriage Ruins

—and with the development of travel by rail the need for the lumbering road carriage was no longer felt.

Smoother and speedier travel was the order of the day—and the railroads met the demand.

The rapid growth of the cities due to the quicker transportation offered by the railroads would not have been so readily possible had there not been concurrent expansion in the street railway field.

The rapid expansion of the electric railways of our cities has made possible the swift development of the world's centers—made it possible for the workman to enjoy a home miles away from crowded factory districts, for farm lands to be laid out in city squares; made possible the rapid transportation of farm products to profitable city markets.

In short, our electric railways have been, to a large extent, the prime factors in the growth of most of our cities.

Galena Oils

and Galena Service—have helped to make possible the increased speeds, longer runs and heavier loads of today, without which the present high efficiencies of our electric lines could not have been attained.

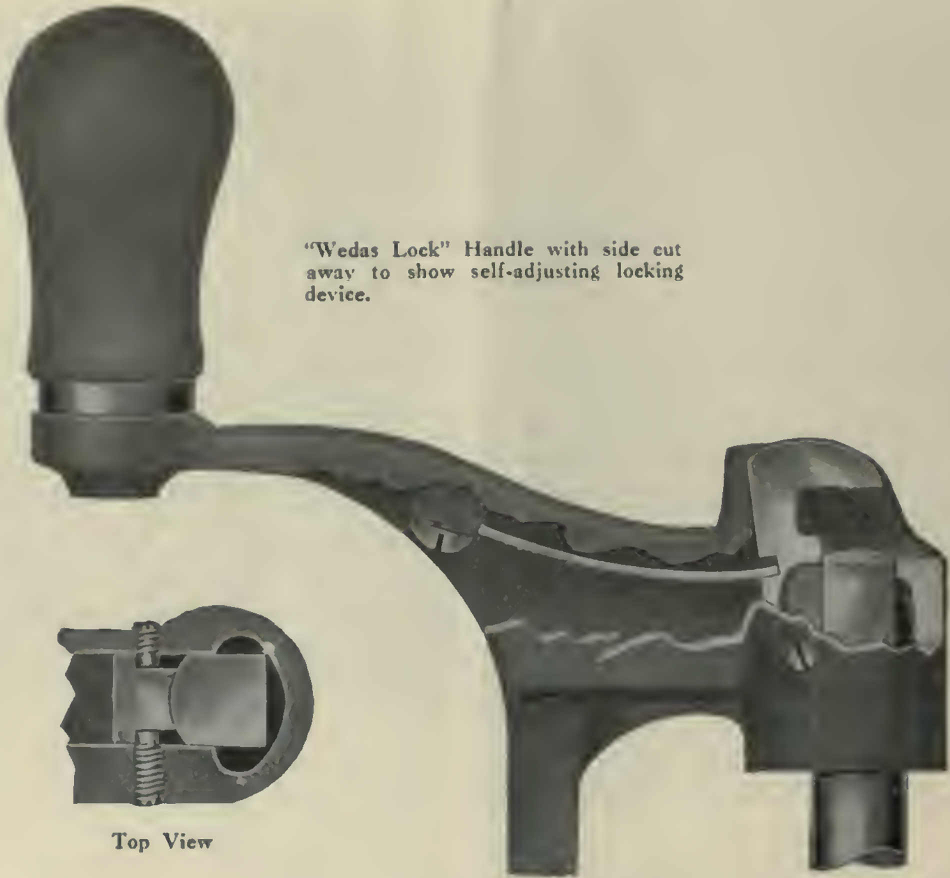
By developing a lubricant that gave a higher service efficiency than had ever before been thought possible.

By creating a lubricating service that has helped railway men to solve problems pertaining to lubrication and helped them to improve lubricating methods, this company feels that it has been a real factor in the electric railway development of this country.

Today Galena Oils are the recognized standard lubricants for railway equipment—they have been for nearly 50 years.

Galena-Signal Oil Co.

Franklin, Pa.



"Wedas Lock" Handle with side cut away to show self-adjusting locking device.

Top View

A "Safety First" Controller Handle

Here is a handle that will not slip off the controller shaft even should the motorman become careless or excited. Its use also reduces maintenance cost by lessening wear on the controller shaft and by eliminating the destructive arcing due to imperfect alignment on segments.

This is the way to remove handle

The GE "Wedge-Lock" Controller Handle clamps tightly to the shaft (even if the latter be badly worn) and yet is quickly and easily removed by using the reverse handle as a lever as shown in the small illustration. This new controller handle is now supplied as standard on practically all GE controllers.

There is a type of "Wedge-Lock" handle to fit each of your controllers.

General Electric Company

General Office Schenectady, N.Y.

40 37

Electric Railway Journal

Consolidation of STREET RAILWAY JOURNAL and ELECTRIC RAILWAY REVIEW

Volume 53 New York, Saturday, January 18, 1919 *Number* 3

Standardization Is More Than Ever a Timely Topic

IN LOOKING forward to the 1919 convention of the Engineering Association one tries to visualize what he would like to see in the program. Involuntarily his mind turns to standardization, now more timely than ever because everything costs so much more than it did before the war. Before anything new in this line is started, it would be profitable to ask why present association standards are not more widely used, so that future standards may be more closely fitted to the industry's needs. A lot of unused standards on the books do not add to the association's usefulness and prestige. Better a few in daily use than many "damned with slight regard," to paraphrase a well-known quotation. There are, however, some fields for new standards which might be entered at this time. Take, for example, the matter of car design. Here a beginning might be made in unifying certain dimensions for the purpose of utilizing standard materials and thus reducing cost. Many detail parts of a car and its equipment are subject to some standardization. Track special work also might come in for attention, a good place to begin being the report on spiral standardization by E. M. T. Ryder prepared originally for consideration by the committee on way matters and printed in the form of an article in the issue of ELECTRIC RAILWAY JOURNAL for April 6, 1918, page 649. Most important of all, the engineers should determine just what they can do best to help in the reconstruction work and then "get busy" in the coming year to do that and only that.

Why Not Stake the Manufacturer?

TEMPORARILY the electric railway industry is in the dumps, but perhaps for that very reason the manufacturer of electric railway devices has never tried harder to help his customers. It is our frank opinion, however, that electric railways are not meeting the manufacturer half way as often as they ought when it comes to the question of inventing or adapting something to meet their needs exclusively. They expect him to hear without murmuring all the development expenses and do not always give him at least the comfort of being without competition. Thousands of dollars are spent. Then, to cap the climax, the bidders may be told that the devices offered are not perfect, that the board of directors won't approve the appropriation or that the price is too high as compared with some stock article that weighs as many pounds, contains as much material or that stands as many inches high or wide!

As a matter of simple justice, any railway that wants something unusual should be willing to bear a part of the development charges—all the more so as the device, though satisfactory for its own conditions, may be worthless everywhere else and may also impose a future burden upon the manufacturer because of storage and other charges in connection with special patterns, jigs, tools, etc. No manufacturer relishes being put in the position of appearing to charge an excessive unit price just because the order is special. He would far prefer to sell at a price comparable with his standard output. This he can do only if the development charges for a special application are billed and paid for as a separate item instead of being concealed in the unit selling price. Then the customer will not look upon the manufacturer as a monopolistic profiteer, while the manufacturer will feel encouraged to develop his inventive facilities to the utmost.

What Equipment Tests Are Necessary or Desirable?

TESTS of electric railway equipment are of two kinds; those which are made during and immediately after the construction of the apparatus to determine the fitness of the materials used and to make certain that the workmanship is all that is desired, and service tests with the assembled equipment operated under every-day conditions. Tests of the latter type are analyzed in an article in this issue by C. W. Squier. The tests which he outlines are very extensive and are such as are frequently made on large electric railway systems. On smaller properties there are not the facilities or instruments for carrying out tests on such a large scale and on these properties the managers would, no doubt, consider the cost of making elaborate tests to be prohibitive. Certain of the tests discussed may, however, be within the reach of the smaller properties, and all can gain much information from this article as to how such tests should be carried out. For the purpose of enabling them to supplement and check manufacturers' claims, a number of roads maintain quite complete testing organizations. The care which they take in testing their equipment shows that they appreciate the importance of this work. The same conviction as to the value of careful testing should pervade even the smallest roads, where the spirit of getting at the root of difficulties by resorting to some form of test rather than by cut-and-try repair methods should be fostered.

For apparatus to be tested by a railway, is no disparagement of the exhaustive work of this character which is done by manufacturers. We all know that the latter have systematized testing procedure until it is well nigh a science. Furthermore, it is the custom of manufacturers to follow up the performance of their equipment in service to enable them to make good any defects in design or workmanship. A little later we plan to publish some articles showing just what the manufacturers do along this line. However, even when the railways receive their equipment in perfect condition, it is necessary to maintain some kind of periodic testing work, with occasional special investigations, in order to determine whether or not the equipment continues to do what is expected of it.

Engineering Association Wisely Decides to Go Forward

THE ELECTRIC RAILWAY JOURNAL has deplored the fact that the American Electric Railway Engineering Association did not continue its activities during the war period, and has expressed this thought on several occasions. It seemed to us and to many others that the association was needed, if ever, to assist its members in doing their work well under adverse conditions. To be sure, it would not have been easy to work under war conditions, and the lines of activity would necessarily have been modified and curtailed; but much could have been done. In view of this conviction we are pleased to note that, after cessation of association activity for many months, the executive committee has opened the throttle and the machinery will soon be in operation again.

For the present attention will be focused on but a few subjects, but these will be selected by a specially appointed committee on subjects which will presumably have several considerations in mind, as follows: First, railway men competent to do effective committee work are heavily overburdened due to the run-down condition of physical equipment. Second, a very limited period is available for the preparation of reports. Third, the program for the convention should be made interesting, stimulating and constructive—in other words, the antithesis of tiresome. Fourth, whatever is done now, whatever is said and done at the convention, and whatever plans are laid for future work, all should be done with the definite object of helping to get electric railways back onto their feet.

To the above end a commendable step was taken by the executive committee in deciding to ignore the present committee organization in preparing a program, in order that the future work may be unhampered by tradition, precedent or committee personnel. As we have pointed out editorially before, there is in the electric railway association (and elsewhere as well) a tendency to keep committees going almost regardless of what they do. Committees are appointed for special purposes, but they are frequently not discharged when they achieve this purpose or prove their incompetence by failing to do so. It is a favorite diversion at public meetings to appoint committees for this or that purpose, sometimes without due consideration. The average committees so appointed do little, prepare perfunctory reports which make unattractive programs, and drag on a miserable existence until somebody suggests that they be "discharged with the thanks of the association." Now is a good time for a committee clean-up in all fields.

Temporary War-Time Construction May Now Have Become a Menace

TEMPORARY structures are quite as much a part of the necessary equipment of a construction company as are wheelbarrows and hammers. But useful as they may be while construction work is on they constitute a menace as well as a nuisance if permitted to remain, and, therefore, like the wheelbarrows and brickbats they should be carted away when the job is finished. We as a nation have just been engaged in one of the largest rush-order construction jobs ever tackled by any people—the creating out of nothing and over night, as it were, of a mighty military machine. We have done the job and in doing it we have had a perfect orgy of temporary construction. As a people we have spent enough money on such construction to build a Panama Canal, an Assouan Dam, and irrigate a chain of small deserts besides. It was all necessary, and we are not bemoaning the expenditure of time, money and materials. The electric railways have done their share along with the other industries. Some of their temporary structures were built because the money was not available to build otherwise, others because the need was known or thought to be transient.

Great as the immediate need of these structures may have been or may now be their presence carries with it a certain element of risk. Regarding them, the motto of the insurance companies is "Beware." Every insurance man knows that a temporary building once in service in the operating field is likely to remain where it is until it either falls down or burns down. In such service not only are they risks themselves but they constitute risks to neighboring property as well. This is the more true since, because of its convenience and general availability, wood is the building material commonly used. Owing to advances in the building art comparatively cheap temporary structures can be built with such materials as concrete, metal lath and plaster, and their use seems desirable wherever temporary operating structures are necessary. In any event, however, a temporary structure should be removed at once when its immediate purpose has been served.

What Causes Curve Resistance?

"CURVE resistance has never been exhaustively investigated, and our knowledge is in several respects deficient." So wrote A. M. Wellington many years ago. Despite the fact that we have developed refined methods of measurement and learned a vast deal about the mechanics of railroading since Wellington wrote the classic volume, "Economic Theory of Railway Location," the statement quoted pretty well sums up the present status of the matter. To engineers who have ever had anything to do with railway location or the selection of motive power, curve resistance possesses a certain fascination. This is because of the presence of some elusive variables which so far have escaped being charted to everybody's satisfaction.

Various theories have been propounded to account for curve resistance. By some writers centrifugal force is assumed to play a major part. Others account for it on the basis of obliquity of traction, that is to say, of the tendency of a train passing around a curve to draw itself straight. Still others believe that the skidding of the wheels incident to the different distances traveled by the inner and outer wheels of an axle is the cause. In a paper contributed by Bulletin 207 of the American Railway Engineering Association, J. G. Sullivan discusses the older theories and presents one of his own which seems to possess some merit.

Mr. Sullivan discounts the centrifugal force theory because with proper superelevation of the outer rail the action of centrifugal force is simply to place more of the weight of the car body on the outer rail. He considers the obliquity of traction theory absurd since a locomotive will push practically as many cars around a curve as it will pull, and all experience has been that it is the outer rail head reather than the inner one that is cut away. Regarding the skidding of the wheels along the rails, Mr. Sullivan makes the point that, even assuming a coefficient of friction of 22 per cent, only one-fourth of the force usually assumed to represent curve resistance would be accounted for.

His own theory is that the reason that the outer wheels "exert a pressure against the outer rail on a curve is the fact that a revolving cylinder tends to rotate on a straight line perpendicular to the axis of rotation"; in other words, he attributes the attempt of the outer wheel flanges to climb the rail head as due to the gyroscopic action of the wheels.

It has been customary to express curve resistance either in terms of grade which would produce an equivalent resistance or as a certain number of pounds per ton per degree of curve. Such expressions neglect the effect of speed and track and truck conditions. If the gyroscopic theory is the correct one it would be expected that curve resistance would vary as some power of the speed. Tests reported in Bulletin 92 of the Engineering Experiment Station of the University of Illinois indicate the truth of this assumption. Other tests made by Prof. L. E. Endsley for the American Steel Foundries show that curve resistance is affected to a very marked degree by the condition of the track rails, truck frames, and wheel treads and flanges. While many experimenters have worked on the problem and a great many more engineers have formulated opinions relative to it, there seems to be nothing available inclusive enough to serve as a basis for general reasoning.

In view of the almost negligible amount of construction work in progress the matter of curve resistance is not of very great interest at the present time. It has never received as much attention as true train resistance because it is usually much smaller in magnitude and, besides, curves ordinarily form a small percentage of the mileage of a railway. These engineers, however, who have to do with mountain grade steam railway electrification could well make use of a more exact knowledge of the subject, as mountain roads have a great deal of curvature, and in some cases the use of special rolling stock is involved. For such equipment the old arbitrary figures of 0.7 or 0.8 lb. per ton per degree of curve do not necessarily apply. At any rate it is better engineering practice to base empirical formulas on known facts than on guesswork and tradition. With the possibilities of accurate power measurement afforded by electric traction and with the recent developments in methods of measuring track stresses, an extensive new investigation of the subject should yield results of considerable technical value.

How Far Can Wages Be Standardized?

IT IS NOW more than five months since the first wage awards to electric railway employees were made by the War Labor Board. The results to the companies following the fixing of comparatively high wage scales for these men have been reviewed from time to time in these columns, and it is conceded generally that these awards brought to a crisis the financial difficulties of many a transportation agency. The harm has been done, however, and there is no prospect of relief from the wage burden unless at the end of six months the companies are able to make a showing which will convince the board that an injustice has been done in any case or that new conditions have arisen which warrant a change.

In this connection some thought might be given to the question of requesting the War Labor Board to depart from its policy of attempting to fix standard wages. This principle undoubtedly was adopted as one of expediency during war times. But the point might well be raised as to whether this policy is strictly fair. In the November issue of the Monthly Labor Review of the United States Bureau of Labor there is an article entitled "Comparison of Food Costs in Forty-Five Cities." From this article one is likely to form the conclusion that if the establishment of a 48-cent maximum wage per hour in a number of cities is fair to some companies, it must inevitably work an injustice on others.

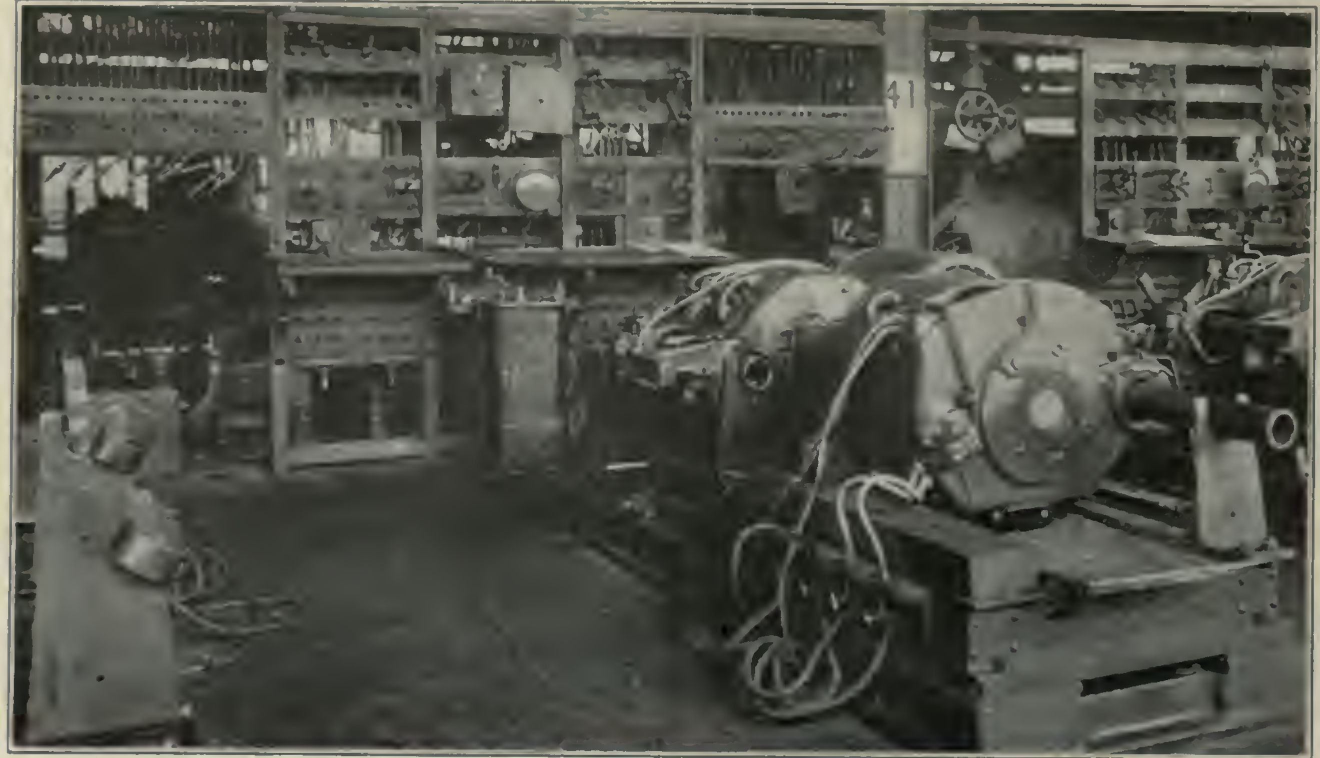
It is true that the board departed somewhat from a fixed standard when it established a 42-cent maximum in some districts, 45 cents in others and 48 cents in still another group of cities. But even these distinctions do not appear to have been based on a careful weighing of "local conditions," if one is to judge from the weighted averages of food prices as listed in the article mentioned above. One finds, for instance, that, as compared with an average of 100 for the United States as a whole, the food cost averages in four of the cities having a 48-cent maximum wage scale for trainmen are 94.20, 98.74, 99.63 and 99.95, while another city for which the 48-cent wage was recently established has an average of 115.02. It is true that these percentages are based entirely on food costs and on only a portion of the articles constituting the entire expenditure for food. Inasmuch as food costs take about 40 per cent of the average expenditure in the cost of living, it is not unlikely that similar differences would be found to prevail on the other items in family maintenance in various localities. To this extent at least there is shown a decided lack of uniformity as between cities. In fact, this contention has been made frequently by employers and employees alike in arbitration hearings where wage scales were the subject of discussion.

If some of the cases over which the War Labor Board has jurisdiction are to be reopened during the next few months the question might well be raised as to whether the interests of justice are best served by the continuance of the present policy of fixing standard wages.

Electric railways can now supply data to show just what effect the standardizing has had upon their operating problems.

Car Equipment Service Tests Determine Fitness of Apparatus

BY C. W. SQUIER
Electrical Engineer



RAILWAY MOTOR TEST AT MANUFACTURER'S PLANT

The Author Describes the Methods of Making Operating Tests and Heat Runs, Tells How Sections of Test Track Can Be Best Laid Out to Represent Actual Service Requirements, Outlines the Organization Necessary for a Proper Test Force and Gives the Results Obtained in a Specific Test

BEFORE ordering the equipment for electric railway cars the operating and designing engineers of the railway devote a large amount of time to preparing specifications and working out the proper materials and apparatus necessary for satisfactory operation. As soon as the manufacturer begins his work on the various parts which enter into the equipment, inspectors from the railway follow the construction carefully to make certain that the material is proper and is used as called for in the specifications.

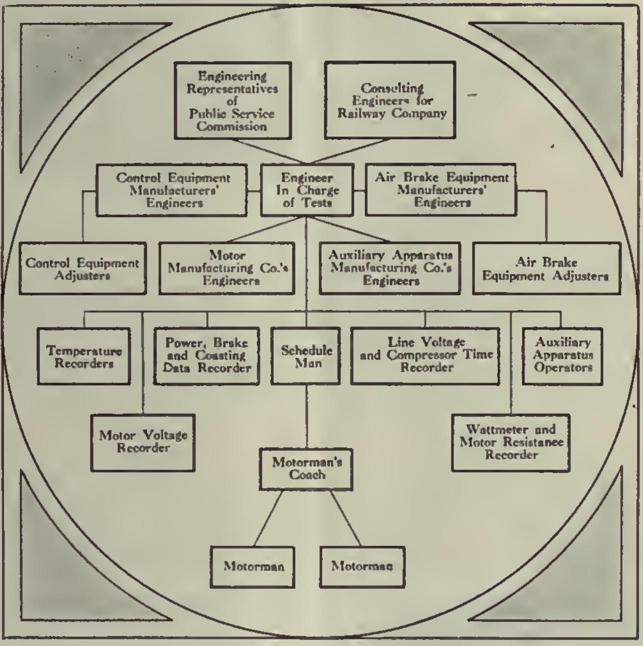
Preliminary tests are usually made at the manufacturer's plant for determining the fitness of the apparatus for the service conditions to be encountered. These commercial tests are intended to locate any defective material that may have been used and also to make certain that the workmanship is up to the standard expected. They are very important and the various manufacturing concerns have provided very complete testing facilities. Each separate piece of apparatus which goes to make up the complete equipment of an electric car is given test after test from the time that its construction is first started until it is assembled for the final running tests. After it has passed the commercial tests at the manufacturer's plant the equipment is usually shipped to the railway company for installation on the completed cars.

After the equipment is received and installed on the cars the officials of the road naturally want to know if it is going to give the service specified satisfactorily and otherwise meet the operating conditions laid down in the specifications. Tests are necessary if this is to be determined with any degree of accuracy. These should preferably be made under actual operating conditions approximating as nearly as possible the service as given in the specifications under which the equipment was purchased. These tests should extend over a considerable period. If made on lines where passenger service is maintained they will seriously interfere with regular operation. It is therefore preferable where possible to to make use of a section of track not used for regular service, but very few roads have such track. Sometimes by rerouting the cars on a portion of a line temporarily, or by using only one track of a double-track section for passenger traffic, a short portion of a line can be made available for test purposes. Most tests except the service-heating test can be made during the off-peak hours.

This usually requires from eight to twelve hours of continuous operation and if it is interrupted for even a few minutes the results become worthless, and the test must be made over again.

TEST RUNS SHOULD APPROXIMATE ACTUAL SERVICE CONDITIONS

With a certain section of track available for the test the first thing to be done is to lay out runs along this track of lengths so as to reproduce the service specified. To illustrate the procedure I shall describe briefly a series of tests of which I recently had charge. The cars were for operation in both local and express service on a high-speed line using train operation. The control equipment was of the multiple-unit type and two motors were used per car. The tests were carried out with a two-car train on a section of track about 3 miles in length. For the motor heating tests, local and express runs were chosen which represented the most severe conditions. Table I gives a comparison of the specification distances and the distances actually laid out for the test of express service. A complete trip was 43,380 ft. long and was made up of six runs of varying length. As the test track was not long enough to make a complete trip operating in one direction, the various runs were made by operating back and forth over the test section. It was, of course, necessary that the point of ending each complete trip should be the same as the starting point, for test operation must be continuous until the apparatus reaches constant temperature. In order to bring the runs back to the starting point the express runs of 9560 ft. and 9870 ft. as given in Table I were changed to 9650 ft. and 9780 ft. respectively by adding and subtracting 90 ft. from the actual distance of these runs. The chart given on page 130 shows the various runs as laid out with the different grades of the lines.


Engineering Representatives of Public Service Commission
Consulting Engineers for Railway Company
Control Equipment Manufacturers' Engineers
Engineer In Charge of Tests
Air Brake Equipment Manufacturers' Engineers
Control Equipment Adjusters
Motor Manufacturing Co.'s Engineers
Auxiliary Apparatus Manufacturing Co.'s Engineers
Air Brake Equipment Adjusters
Temperature Recorders
Power, Brake and Coasting Data Recorder
Schedule Man
Line Voltage and Compressor Time Recorder
Auxiliary Apparatus Operators
Motor Voltage Recorder
Wattmeter and Motor Resistance Recorder
Motorman's Coach
Motorman
Motorman

ORGANIZATION CHART OF TESTING FORCE

STOPPING SIGNS ARE OF GREAT ASSISTANCE

The various stopping points were indicated by large white signs with black numerals printed thereon. These stopping signs were located on the right-hand side of the track as they were being approached by the train. The motorman's operating cab was located on the right-hand side of the car when facing the front end, and this location of the signs was most convenient for the motormen. All lengths of runs were laid out so that the front end of the train would stop opposite the stop sign. Where the direction of operation was changed, as was necessary in operating back and forth on the test section of track, allowance had to be made, of course, for the length of the train, so that the motorman at each stop could bring the front end of the train to rest opposite the stop sign in each case. By using large signs with conspicuous numerals painted on them the motorman was able to see where the stop was to be made a considerable distance in advance of the stopping point. An accompanying illustration shows one of these stopping signs in position. For the test a two-car train was used and it was loaded with bags of sand to give a weight equal to that of a standing load of passengers. The motor equipment consisted of two motors per car mounted one on each truck. By the use of two cars the difference in temperature of the motors at the ends and in the center was obtained. For operating the train two motormen were used, one at each end of the train. This was necessary as the duration of stop was insufficient for the motormen to change ends. The complete test force was as follows: One engineer in charge; two motormen; one motorman's coach; one schedule man; one power, brake and coasting data recorder; one line voltage and compressor operation recorder; one motor voltage recorder; one wattmeter and motor resistance recorder; eight temperature recorders, and two auxiliary apparatus operators. The entire testing force was under direct supervision of the engineer in charge of the tests.

TABLE I—DISTANCES AND RUNNING TIME FOR EXPRESS RUNS IN MOTOR-POWER-CONSUMPTION AND HEATING TESTS

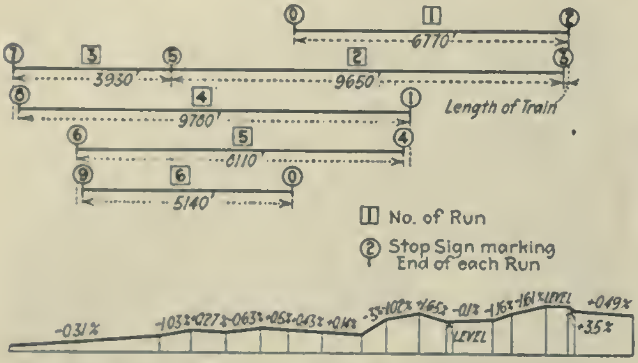
Specification Distances, Feet	Distances Used, Feet	Running Time, Min.	Running Time, Sec.	Duration of Stops, Seconds	Total Time, Min.	Total Time, Sec.
6,770	6,770	2	34	30	3	4
9,560	9,650	3	32	30	4	2
3,930	3,930	1	43	30	2	13
9,870	9,780	3	35	30	4	5
8,110	8,110	3	4	30	3	34
5,140	5,140	2	12	30	2	42
43,380	43,380	16	40	180	19	40

Average length run, 7,230 ft.; schedule speed, 25.05 m.p.h.

In addition to the test force the various manufacturers of the equipment under test had engineering representatives present and workmen ready to make any adjustment of the equipment that was considered necessary. Representatives of the Public Service Commission and various consulting engineers for the railway also assisted the engineer in charge of the tests. An organization chart of this test force is shown in an accompanying illustration.

TEST INSTRUMENTS USED

All test instruments were located in one car and the connections for the various instruments are shown in an accompanying illustration. Three wattmeters were connected as follows: The first in the main motor circuits measured the total power used for propelling the car. The second in the battery circuit measured the power used for operating the control, air brakes, door apparatus, signal system and other auxiliary apparatus using battery current. The third was connected in the compressor, heater and light circuits and was arranged with switches so that the power used by each could be measured separately.



HEATING TEST RUNS FOR EXPRESS SERVICE

TESTING SET FOR MEASURING RESISTANCE

Indicating ammeters and voltmeters were also installed as follows: A voltmeter was connected to indicate line voltage. A second voltmeter was connected to show the voltage across No. 2 motor and by the use of a single-pole double-throw switch to read the voltage across the tapped field of the same motor also. A third voltmeter was connected to show the voltage of the battery. Ammeters were connected in the main motor circuits to give the total current used in propelling the car, in auxiliary circuits to show the current taken by the compressor, the lamps and the heaters, and in the battery circuit to indicate the current taken in operating the various pieces of apparatus using battery current.

A Queen's "dial decade" testing set was connected across the full field of No. 2 motor on the test car. The resistance of this field was measured at the end of each complete trip and from these readings the temperature of the field winding was computed. As already stated this furnished an accurate method of determining when the temperature of the field had become constant.

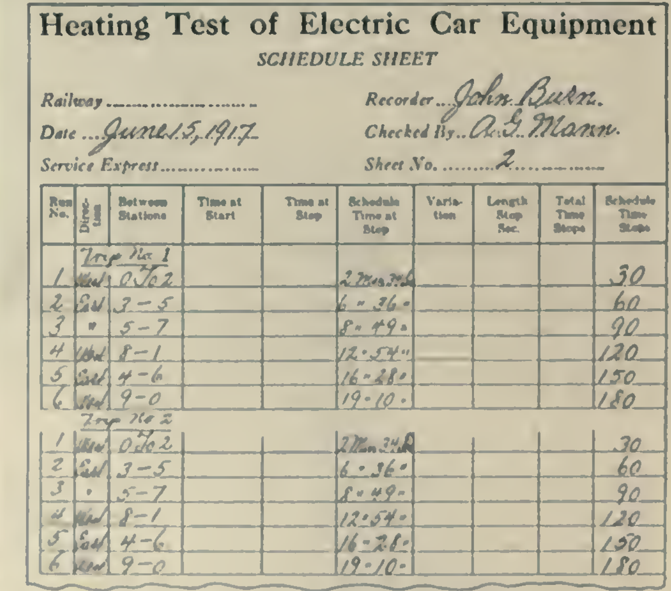
An indicating lamp was connected in the circuit of the compressor governor so that this lamp remained lighted while the compressor was running. An observer was thus enabled by observing this lamp to record the time that the compressor was operating.

A Johns-Manville speed indicator with a friction device on one of the car wheels gave the speed at which the cars were operating at all times.

Thermometers were located inside the car, underneath the car at either end and in the center, and on station platforms, to give the temperature of the outside air. At the end of the heat test additional thermometers were placed inside the motors to give the temperature of the various windings and of the commutator.

STOPPING SIGN IN POSITION ON TEST TRACK

Variations in voltage, current, speed, etc., are more accurately recorded where automatic recording instruments are used. In the particular tests outlined such instruments were not available but in a later series of tests made on this same equipment graphic recording ammeters and voltmeters manufactured by the General Electric Company were used. A chronographic mechanism was employed with these and with some pressure recording instruments installed in the air brake system. This provided a time record which was the same for all instruments and made it easy to transfer the records to a common sheet later. A graphic recording ammeter with time-marker clock is shown herewith.



Heating Test of Electric Car Equipment

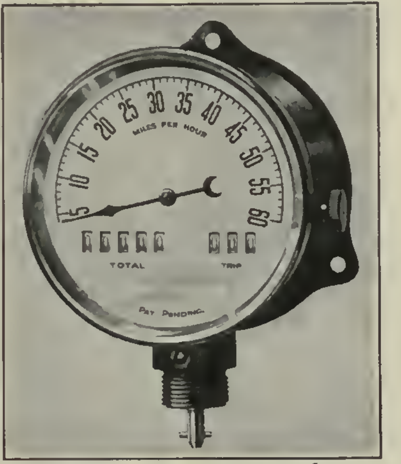
SCHEDULE SHEET

Railway ....
Recorder ...John Burn.
Date ...June 15, 1917
Checked By ..A. G. Mann.
Service Express..........
Sheet No. ....2........

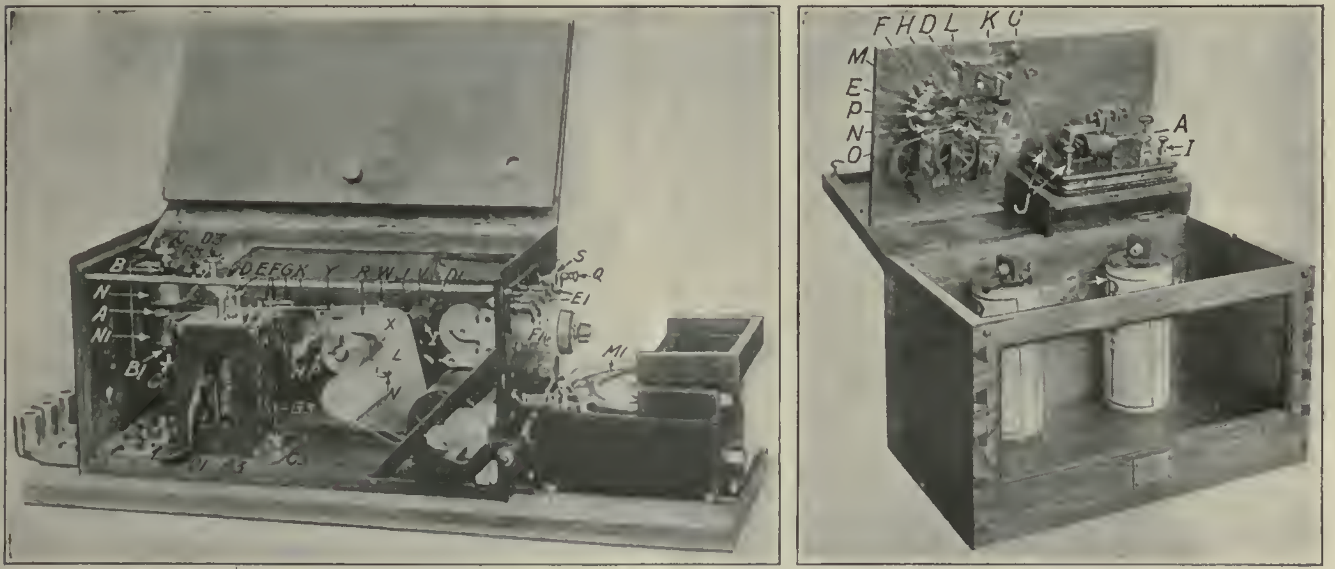
Run No.	Direction	Between Stations	Time at Start	Time at Stop	Schedule Time at Stop	Variation	Length Stop Sec.	Total Time Stops	Schedule Time Stops
		Trip No 1							
1	West	0 to 2			2 Min 34 Sec				30
2	East	3 – 5			6 " 36 "				60
3	"	5 – 7			8 " 49 "				90
4	West	8 – 1			12 " 54 "				120
5	East	4 – 6			16 " 28 "				150
6	West	9 – 0			19 " 10 "				180
		Trip No 2							
1	West	0 to 2			2 Min 34 Sec				30
2	East	3 – 5			6 " 36 "				60
3	"	5 – 7			8 " 49 "				90
4	West	8 – 1			12 " 54 "				120
5	East	4 – 6			16 " 28 "				150
6	West	9 – 0			19 " 10 "				180

SCHEDULE SHEET FOR ENTERING OPERATING RESULTS

Previous to starting the tests several trial runs were made to determine the length of time necessary for power to be applied to the main motors to maintain the schedule speed desired. From the results thus obtained tables were made up, showing the time necessary to apply power in order to maintain the schedule as laid out for the various runs. To enable the motorman to maintain the schedule speed as laid out, a schedule man kept record of the running time and length of stop and also gave the signal for starting the train. These results were entered on schedule sheets, a sample of which is illustrated herewith. The schedule sheets contained the correct running time for comparison with the results obtained so that at each stop the amount that the motorman was ahead or behind schedule could be seen at a glance. The information was given to a second man who acted as motorman's coach. The coach had a set of tables, already referred to above, with the time that it was necessary to keep power on to maintain the schedule speed for the various runs. He was thus enabled to tell the motorman when to drop off or to resume power and where the next stop was to be. If the train was behind its schedule time the power was kept on slightly longer and if it was ahead of time power was dropped off sooner than for regular operation.



SPEED INDICATOR



GRAPHIC RECORDING AMMETER AND TIME-MARKER CLOCK

Letters are used to point out the essential parts.

This system worked out exceedingly well so that at no time there was a variation of more than a minute from the schedule. The braking was left entirely to the motorman, his only instructions being to make as smooth a passenger stop as possible at the point designated. He was also permitted entire freedom of operation in case of emergency.

The recorder of "power-on," coasting and braking time used a stop-watch and recorded the length of time that power was kept on and the amount of time used in coasting and braking. On the runs, line and motor voltages were read and recorded every five seconds, and the time that the compressor was operating was recorded. At the end of each trip the following readings were taken and records made: Readings of the wattmeters in the motor, compressor and battery circuits; resistance of the full field of No. 2 motor to check the temperature rise and determine when this had become constant; temperature readings inside the cars, underneath each end of the cars and on the station platform. On certain runs records were taken every five seconds of the speed of the train, the motor current, the compressor current, the battery current and the battery voltage. At each stop the doors and signal system were operated as they would have been in regular passenger operation. All parts of the equipment were thus subjected to operating tests representing the most severe conditions.

In making the temperature tests the various runs were continued for at least an hour after the resistance readings indicated that a constant temperature of the windings had been reached. When it was certain that no higher temperature would be obtained the runs were stopped and temperatures were taken by thermometer as follows: Air inside cars; air underneath each end of the car; air on station platform; and, armature coil, field core, commutator, main field and interpole field, for each motor of the train. All runs were made with the covers on all motors, and in taking motor temperatures at the ends of the runs the motor covers were removed and the thermometers placed as rapidly as possible.

These cars were each equipped with a 32-volt storage battery which was of great assistance in providing light for reading the various thermometers. A separate 32-volt droplight, with a long flexible cord, was provided for each motor. These lamps were small so that they could be readily inserted in the various spaces inside the motors and temperatures were thus able to be read without disturbing the thermometers. While such readings are being taken it is very important that all danger of shock from coming in contact with live parts be eliminated. The use of an auxiliary battery for the drop lights has a great advantage in this connection as all potential can thus be removed from all car equipment.

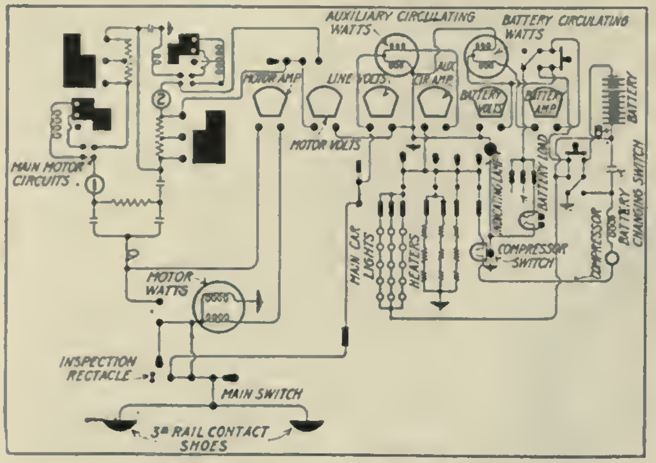
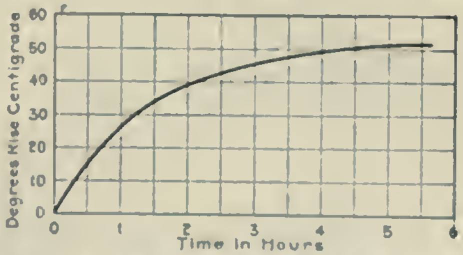
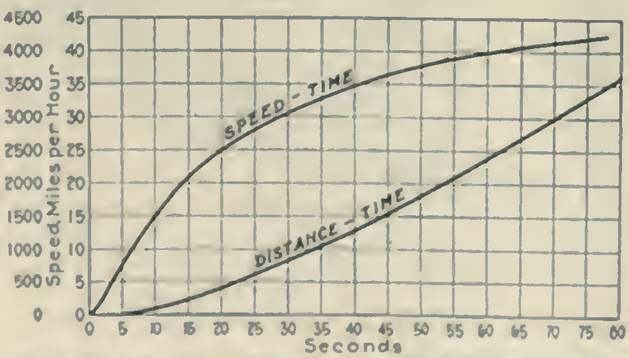


DIAGRAM CONNECTIONS FOR TESTING INSTRUMENTS

Before such a temperature test is started it is advisable to make certain that all covers can be readily removed from apparatus on which temperature readings are to be taken. In the first test of this nature with which I was connected it was almost impossible to remove several of the motor covers. The removal of covers out on the line is quite a different proposition from their removal in a shop provided with proper facilities. Also such tests are usually made with cars loaded and the clearances between the tops of motors and the car body are often very small. In the particular case mentioned it took twenty minutes to remove the covers after the test was discontinued so that there was a considerable drop in temperature of the windings before the thermometers could be placed. This, of course rendered the results worthless.



MAIN-FIELD TEMPERATURE RISE AS COMPUTED FROM RESISTANCE MEASUREMENTS



ACCELERATION AND DISTANCE GRAPH FOR TEST TRAIN

SOME RESULTS OF A SERVICE TEST

In the service heat runs which I have been considering in this article, runs corresponding to local service, express service and mixed local and express service were made on successive days. Constant temperature was reached in the main field winding of the motors in local service after six hours' operation, in express service after five and one-half hours and in mixed local and express service after five and one-half hours. The maximum temperature rise as taken by thermometers at the completion of the runs was 59 deg. Cent. above the surrounding air. This was found in the interpole field windings after runs corresponding to local service were completed. The specification requirements were for a rise not to exceed 65 deg. when measured with thermometers. The motors thus met the requirements. An accompanying graph shows the temperature rise for express service as computed from the resistance measurements for the main field of No. 2 motor of the test car as already described.

TABLE II—OPERATING DATA FROM TEST RUNS

	Local Service	Express Service	Mixed Local and Express Services
Average line voltage....................	537.6	550 0	551 6
Per cent of total time of "power on".....	26.4	14 0	37 4
Per cent of total time coasting...........	44.1	53.6	34.6
Per cent of total time braking....... ...	11.3	17.9	11.6
Per cent of total time used by stops.....	18.2	14 5	16.4
Average rate of acceleration............	1.5	1.5	1.5

TABLE III—COMPRESSOR PERFORMANCE, EXPRESS SERVICE

Trip No.	Total Time of Run, Min.	Sec.	Time Compressor Operated, Min.	Sec.	Per Cent of Total Time Comp. Operated	Av. Line Voltage	Kw.-Hrs. Used
1	38	56	15	28	39.72	529.3	1.0
2	38	11	15	42	41.11	547.3	1.3
3	38	27	16	37	43.21	533.5	1.3
4	38	02	15	38	41.10	543.9	1.0
5	38	16	13	35	35.50	547.4	1.2
6	38	43	13	30	34.86	546.0	1.0
7	38	30	16	16	42.23	557.2	1.2
8	38	36	15	16	39.55	557.6	1.2
9	38	50	15	05	38.84	564.9	1.4
10	38	44	14	22	37.10	556.3	1.0
11	38	52	16	08	41.51	556.7	1.2
12	38	21	15	32	40.50	552.7	1.2
13	38	39	15	12	39.32	552.7	1 2
14	38	42	16	00	41.34	555.0	1 3
Total,	539	49	214	21	39 39	550.0	16.5

Length of each run = 16.41 miles
Length of fourteen runs = 229.74 miles
Weight of car loaded = 120,000 lb. = 60 tons

$$\text{Compressor watt-hours per car-mile} = \frac{16{,}500}{229.74} = 71.82$$

$$\text{Compressor watt-hours per ton-mile} = \frac{71.82}{60} = 1.197$$

OPERATING RESULTS CORRESPONDING TO DIFFERENT SERVICE CONDITIONS

In order to compare the operation of the test train with that of actual service the records obtained were averaged for the various runs. Table II gives the percentages of the various lengths of time that were consumed in coasting, braking and stops. Information is also tabulated for the percentage of total time that power was used and the average line voltage. The percentage of time taken by "power on" coasting and braking represent ideal conditions, as there were no extra stops or slow-downs for signals such as is encountered in regular service. Another accompanying graph shows the acceleration of the test train on level tangent track up to a speed of 42.5 m.p.h.

The performance of the compressors on the cars in the test train, while operating in express service, is shown by the results given in Table III. This table will serve as an illustration of the type of data that are most desirable for comparing the performances of the various pieces of auxiliary apparatus comprising a complete car equipment. Similar data were compiled for other pieces of auxiliary apparatus making up the complete car equipment, such as heaters, door engines, signal equipment and lights, this latter being divided into head, tail, marker, emergency and main car lights.

TABLE IV—POWER CONSUMPTION MAIN MOTORS FOR TEST RUNS IN EXPRESS SERVICE

When Taken	Wattmeter Reading	Kilowatt-Hours
Start	2,174.2	....
After run No. 1	2,240.6	66.4
After run No. 2	2,300.8	60.2
After run No. 3	2,362.7	61.9
After run No. 12	2,970.0	66.4
After run No. 13	3,037.2	67.2
After run No. 14	3,104.4	67.2

Total kilowatt-hours, fourteen trips, 930.2; multiplier, 1.047. Corrected total, kilowatt-hours, fourteen trips, 973.9194. Length each run, 86,760 ft. = 16.430 miles; length, fourteen runs, 230,020 miles; weight of car loaded = 120,000 lb.; kilowatt-hours per car-mile = $\frac{973.92}{230.02}$ = 4.234; watt-hours per ton-mile $\frac{4234}{60}$ = 70.567.

The power consumed by the main motors in propelling the car in express service is shown by Table IV. Similar results were worked out for all the different classes of service. These values were used to check the results obtained with theoretical values previously computed and later with tests made in actual service when passengers were carried in regular operation.

Costs of Maintaining Differential Gear Drive at Huddersfield

IN THE issue of the ELECTRIC RAILWAY JOURNAL for July 3, 1915, page 26, there was described a differential drive for electric railway cars which had been installed on a number of cars in Huddersfield, England. This has now been in use long enough to render data of maintenance costs both reliable and interesting. In response to a request for such data, R. H. Wilkinson, manager of the Bradford Corporation Tramways, has furnished Tables I and II. In each case ten cars are included and the tables cover two successive years, up to the end of September, 1918. The differentially geared cars operated on the Honley route, where the track is in very poor condition, but the other cars are running on good track.

Mr. Wilkinson calls attention to the fact that the comparison is hardly fair to the differential gears on account of the difference in track condition. The Honley route track is mostly single line with loops, whereas the cars with the ordinary gears were run on a double-track line with newer rails in first-class condition.

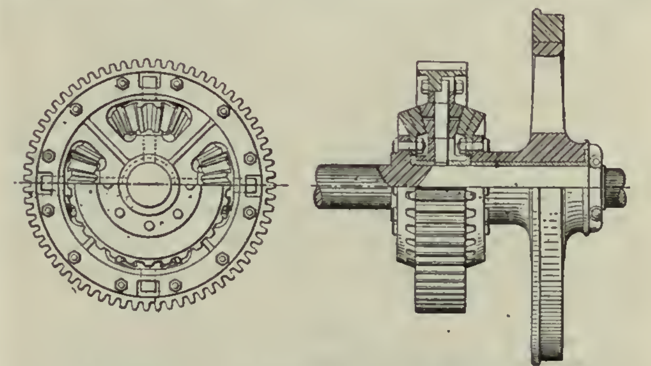
TABLE I—REPAIR COSTS OF TEN CARS EQUIPPED WITH DIFFERENTIAL AND ORDINARY GEARS, YEAR ENDED SEPTEMBER, 1917

	Differential Gears		Ordinary Gears	
	Labor	Material	Labor	Material
Gears	$110	$78	$66	$70
Axles and bearings	289	691	151	582
Car wheels, bushings and tires	184	935	113	848
Totals	$583	$1,704	$330	$1,500
Grand total:				
Differential gears				$2,287
Ordinary gears				1,830
Difference				457

TABLE II—REPAIR COSTS OF TEN CARS EQUIPPED WITH DIFFERENTIAL AND ORDINARY GEARS, YEAR ENDED SEPTEMBER, 1918

	Differential Gears		Ordinary Gears	
	Labor	Material	Labor	Material
Gears	$179	$507	$168	$317
Axles and bearings	447	655	271	594
Car wheels, bushings and tires	181	538	138	200
Totals	$807	$1,700	$577	$1,111
Grand total:				
Differential gears				$2,507
Ordinary gears				1,688
Difference				$819

He states further that the differential gears were introduced to eliminate rail corrugation trouble. Prior to the introduction of the new type gears on the Honley section the corrugations were ground out as far as possible by means of emery blocks attached to a car truck. This work was done at night and it is possible that in a few places where the track was loose and uneven the grinding was not so effectively done as where the track was in good condition. Since October, 1914, this section has been worked entirely with the differentially-geared cars, and with a few slight exceptions corrugations have not reappeared. The exceptions are in places where the track is very loose on its foundation. Mr. Wilkinson is in doubt as to whether the corrugation is in consequence of the looseness of the track or vice versa.


DIFFERENTIAL GEAR USED ON HUDDERSFIELD TRAMWAYS CARS

The experience on the Honley section is significant in that one of the theories of corrugation is that it is due to the slipping and skidding of the wheels. These are, of course, absent with the differentially-geared cars. There is no difference in energy consumption between the cars equipped with the two types of drive.

The Chicago, Milwaukee & St. Paul Railway is making a total annual saving due to reclamation work estimated at more than $7,000,000. A special committee has recently been at work studying this matter with a view to determining whether the procedure could be improved. Discarded material is reclaimed for remanufacture, reclaimed for salvage or reclaimed for similar use. The principal items in the reclamation work are rubber hose, babbitt and lead, brass, bolts and nuts, waste paper, metal roofing, springs, hammered scrap iron, car wheels and lumber. The committee report states that materials are commonly reclaimed by means of oxy-acetylene welding, electric welding, forging equipment, rolling mills and miscellaneous means.

Collecting Zone Fares in Boston

Professor Richey Shows That Two-Zone Plan for Boston Elevated Railway Is Best First Step Toward the Ideal—Proposes a Concrete Plan for Getting the Fares

THAT a two-zone system of fares is practicable for the Boston (Mass.) Elevated Railway is the opinion of Prof. Albert S. Richey. The general conclusions of his report on this subject to the public trustees of the company were published in the ELECTRIC RAILWAY JOURNAL of Dec. 28, page 1141, but additional material from the full report now available will be presented below. The new material relates chiefly to the reasons for recommending a two-zone plan for Boston and the method suggested for handling the collection of fares.

REMOVING OBJECTIONS TO THE ZONE IDEA

According to Professor Richey, it is generally conceded that a rate scheme where the fare is in some way dependent upon the length of ride is more nearly equitable both to the passenger and to the company than the flat-rate system. Continuing, he comments in part as follows upon the most frequent objections to a zone system, *i.e.*, its sociological defects and the difficulty of collection:

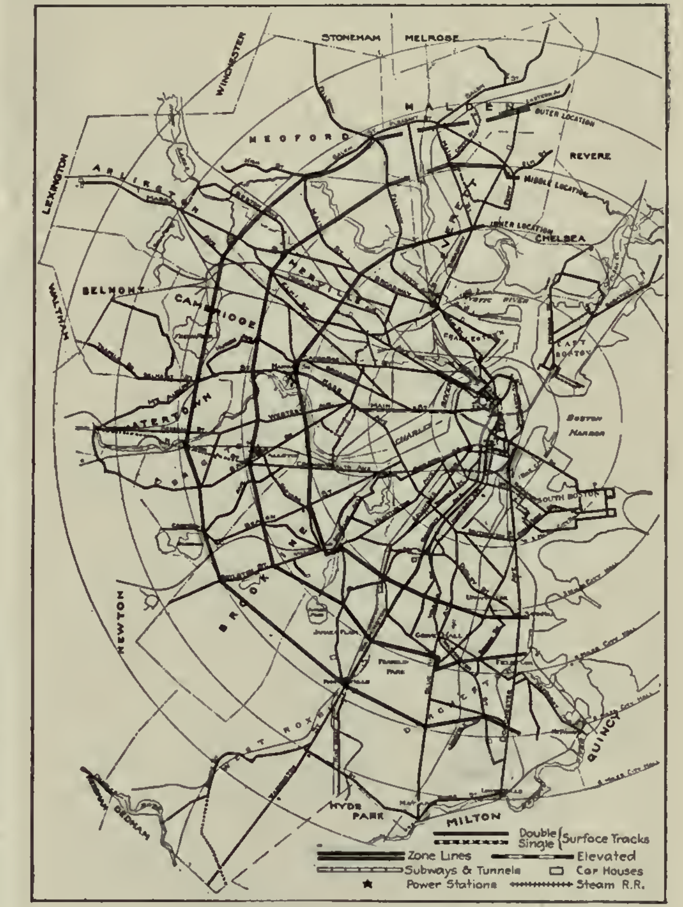
> The most frequently cited "proof" that a zone system produces congestion is the great congestion of European cities where the zone system of fares is commonly used. While it is true, in general, that most of the European cities are more densely populated than most of the large American cities, this statement is not specifically true, for although it is impossible to make accurate comparisons, there is nevertheless great congestion in some American cities. Boston has been shown to have a larger population per square mile than Vienna or Paris, and New York, Philadelphia and Chicago have been shown to have a greater population per square mile than London or Manchester. As to maximum density of population, Boston has been shown to equal London, and New York to be greater than either Paris, Vienna or London. The surface lines in Berlin and Hamburg have a flat fare, and both of these cities are as congested as Cologne or any other city where a zone system is used. The argument that the zone system has caused congestion in European cities disappears when it is realized that these old European cities had their congested areas long before the first electric railways were built and that the operation of these railways under the zone system has helped to relieve congestion.
>
> Among the factors which tend to influence the place of residence, in addition to the amount of car fare required between place of residence and place of work, are (1) time of journey between home and work; (2) amount of rent in various localities; and (3) gregariousness, or the hesitancy of individuals and single families to separate themselves from those with whom they have been associated. The latter is especially to be noted in those communities where several races are living.
>
> R. C. Chapin, in his report on *Standards of Living in New York City* to the Russell Sage Foundation in 1909, shows that the average expenditure for car fare of families in Greater New York having incomes ranging from $400 to $1,600 is from 1.1 per cent to 2.6 per cent. The rate of fare is only one of a number of factors which may affect congestion of population, and from such data as are available, it does not appear to be one of major importance. Furthermore, the objections which may be raised to the European zone system of small zones with constantly increasing rates of fare are not equally applicable to a system which divides a city such as Boston into two or three relatively large zones with a flat rate of fare in each.
>
> The chief objections raised by the American electric railway operator to any sort of zone system of rates are the difficulties of fare collection. Many of these objections, however, disappear when instead of a series of short zones of a half mile to a mile in length, a modified system consisting of a fairly large inner zone and one or two outer zones is applied to a city such as Boston.
>
> As to actual experience with the collection of zone fares, the following is quoted from a letter dated Oct. 17, 1918, from P. N. Jones, general manager Pittsburgh Railways:
>
> "The only thing wrong with the new system of fares in Pittsburgh is that it does not bring in revenue enough. We think it is correct theoretically, and we believe it is the only practical scheme by means of which fares may be collected on large cars, approximately on the basis of the distance ridden. The pay-as-you-leave scheme . . . has not added to the congestion appreciably in the outer districts because the people do not leave the cars more than one-half dozen or so at each stop. There has been no confusion in the minds of the passengers as to which end of the car to board."
>
> A zone system is also in use on one of the lines of the Northern Ohio Traction & Light Company, Akron, Ohio. Although this is a much smaller city than Boston, the ordinary type of pay-enter car, having a seating capacity of fifty-four passengers, is in use, and during rush hours loads of 100 per cent in excess of this number are not uncommon—"the average maximum number of passengers during rush hours is ninety." A combination of pay-enter-pay-leave system is in use, and F. I. Hardy, general superintendent of railways, states in a letter dated Oct. 18, 1918, that there has been no difficulty relative to confusion in the passengers' minds as to whether they should pay their fare in boarding or alighting, or as to whether they should enter or leave the car at the front or rear end. Further, in this connection, Mr. Hardy states:
>
> "Replying to the question, 'To what extent does this system of fare collection slow up operation, especially in rush hours with heavy loads,' wish to advise that it does not slow our operation at all. This system is in effect on lines which have the fastest schedules that we operate. We have operated this system for many months and are very much pleased with its operation. In fact, we have devised a system whereby we believe it is perfectly feasible to operate a zone system of two to five zones without confusion or without the passengers being able to beat the company out of its revenue."
>
> A similar zone system, with a combination of pay-enter and pay-leave fare collection, is in use between East Liverpool, Ohio and Chester, W. Va., located on opposite banks of the Ohio River. The total length of the line is 3.4 miles, divided into two 5-cent zones. The cars have a seating capacity of sixty and carry maximum loads of 100 to 135 people. C. A. Smith, general manager, states that no trouble is being experienced with the pay-leave system.
>
> If a decision be made that a zone system of fares is desirable from other standpoints, I am firmly convinced that the fares can be collected and audited properly by a method closely approximating that recommended herein, provided the proper spirit of endeavor and co-operation prevails throughout the organization.

THE IDEAL RATE SYSTEM

In Professor Richey's opinion, the ideal rate system should, as nearly as it is possible to approach theory with practice, provide for each passenger paying his proportionate part of the "readiness-to-serve" cost, as well as his proportion of the "movement" cost, based on the distance traveled. As the "readiness-to-serve" charge varies as between the rush and non-rush hours, this ideal system should also make a variation in the initial charge as between those times. This would result in a unit initial fare, varying as between hours of the day, and increased by smaller increments for each mile or fraction of a mile traveled. The further requirements of the ideal rate system are that it should not unduly delay traffic, that it should not be unduly expensive in its operation, and that it must be adaptable to the proper collection of fares. The latter qualification involves the collection of fares so as to avoid both error and dishonesty on the part of the passengers and the employees.

Various modifications of the ideal system have been used or proposed, each approaching more nearly to an equitable charge for the service rendered than the flat fare. They include (1) the transfer charge; (2) no transfer between surface and rapid transit lines; (3) an increased fare for passengers using rapid transit lines; (4) a zone system of fares on a strictly distance basis; (5) a zone system on a modified distance basis; and (6) a two or three-zone system. In regard to these Professor Richey says in part:

> 1. *Transfer Charge:* The principal and practically the only advantage of the transfer charge, as applied to Boston, would be the ease with which it might be effected from the fare collection standpoint, if it were applied universally. Its universal application would, however, work a substantial injustice on a large number of passengers. If it were applied only at such points and between such routes as to make it in effect an additional charge for a ride longer than the average, the effect would be: first, to reduce the number of transfers for which a charge would be made to a very small proportion of the total passengers; and second, to involve a segregation between free and charge transfer passengers at such points as Park Square as to make its actual application almost impossible.
>
> 2. *No Transfer Between Surface and Rapid Transit Lines:* The great disadvantage of a segregation of the two systems in Boston would be the tendency of such a plan to divert traffic from the rapid transit to the surface lines. As the company is at present committed to the large fixed charges incident to the ownership of the rapid transit lines, and as the operating costs (aside from fixed charges) per passenger are so much less on the rapid transit lines than on the surface, every endeavor should be made to increase the relative use of the rapid transit lines rather than to diminish it. The collection of two fares for a journey combining rides on both surface and rapid transit lines would induce a great number of people to make their entire journey, where possible, by surface cars. This would involve additional service on the surface lines which would be accompanied by no increase in revenue, and it is quite probable that the net result of the change would be a loss unless it was the desire and within the power of the company so to route its surface cars as to compel passengers from the outlying districts to transfer to the rapid transit lines.
>
> 3. *An Increased Fare for Passengers Using Rapid Transit Lines:* This plan, which merely would involve the collection of an additional increment of fare from passengers leaving all rapid transit stations, probably could be effected without involving any great practical difficulties, and it probably would be more fair to the passenger than a complete segregation of the surface and rapid transit lines. It is, however, open to the objection that it would impose an additional fare on the passenger who made his whole journey, however short, by rapid transit line, even though the actual cost to the company was less than that involved in carrying him the same distance and over practically the same route in a surface car. The objections relative to the tendency to divert traffic from rapid transit to surface lines, mentioned in connection with the previous plan, also apply to this.
>
> 4. *Zone System of Fares on Strictly Distance Basis:* This is the European system where (in English cities) fares are collected in penny or half penny units for zones varying from one-half to 1 mile in length. The cars in use there are much smaller than in this country and operate at much slower speeds and with much less crowding than is the case in rush hours here. The system is not used in any American city, and its only serious proponent among men with electric railway experience in this country is Peter Witt, formerly Street Railroad Commissioner of Cleveland. Fielder Sanders, the present Street Railroad Commissioner, has recently been doing some checking to determine the length of haul on some of the lines, but at present he has arrived at no definite conclusion as to the merits of such a zone system. Mr. Sanders says in a letter of Oct. 8, 1918: "The trend of our investigation leads me to suppose that no zone system, the maximum fare of which is 5 cents, would bring in for Cleveland as much revenue as we are now getting on the straight 5-cent fare." In other words, Mr. Sanders' investigation does not yet indicate to him that the loss in revenue on account of reduction in fare to a large number of passengers will be offset by new patrons drawn by the extremely low fares. While I am in accord with Mr. Witt in believing that a low rate of fare in some districts and under some conditions may attract some additional business, I am not willing to agree that the initial fare should be as low as he suggests [on a 1-cent zone basis], for the reason that this does not at all recognize the substantial "readiness-to-serve" cost. Furthermore, it is extremely doubtful whether it would be possible to apply such a system of fare collection in Boston as is proposed by Mr. Witt, especially as an initial change from the present flat-fare system.
>
> 5. *Zone System on Modified Distance Basis:* Practically, the collection of a fare consisting of a flat initial charge plus an increment for each unit of distance traveled would be surrounded by as many difficulties as that of the strictly zone system as practiced in English cities. When it is considered, however, that a great proportion of the whole number of passengers begin or end their journey in the central portion of the city, something of the same order may be attained by the introduction of a central flat-fare area, with the lines radiating therefrom on a mileage fare basis. [Professor Richey's comments upon the use of such a system for the Bay State Street Railway and the Rhode Island Company were published in the ELECTRIC RAILWAY JOURNAL of Dec. 28, page 1142.—Eds.] Based on the experience of these companies, it is not considered advisable to recommend such a system for use in Boston, at least at present. Should the two or three-zone system be adopted and found to be practicable, it is entirely possible that the experience thus gained may result in the development of a fare collection scheme under which the plan mentioned above may be practically worked out for the



LOCATION OF PROPOSED ZONE LINES, 3, 4 OR 5 MILES FROM BOSTON CITY HALL city of Boston. If this can be accomplished, it would be most desirable and probably the nearest approach to the strictly equitable fare system that can be hoped for.

6. *Two or Three-Zone System:* The two-zone plan has recently been adopted in a number of cities. In Holyoke, early in 1918, a large 5-cent flat fare area was considerably reduced, with a 5-cent fare for local rides in both the inner and the outer area, and a fare by means of tickets of either 6⅔ cents or 7½ cents for a ride extending through both inner and outer areas.

In Springfield a similar system was made effective on May 1, 1918. The 5-cent flat fare, with universal transfer, was retained in the inner area, with a similar 5-cent flat fare in the remaining or outer area. Reduced rate tickets at the rate of 6⅔ cents were good for a ride between any point in the inner area and points in the outer area within about 5 miles of the City Hall. Other reduced rate tickets at 8⅓ cents were good between any point in the inner area and any point in the outer area. The cash fare was 10 cents between any point in the inner area and any point in the outer area. The only difficulty which has been experienced in the collection of fares in Springfield has been that due to the complications introduced by the reduced rate tickets. The system as a whole has worked out satisfactorily and produced nearly the predicted amount of revenue. On account of greatly increased wages later awarded to the employees by arbitration, it was necessary to increase the rates, and in September the unit rates were increased from 5 to 6 cents and the ticket rates were increased about 1 cent in each case. No change was made in the general principle or in the zone limits. By use of the reduced rate tickets, Springfield practically is a three-zone system, while nominally, and on the cash fare basis, it is two-zone.

Through the changes at present proposed in the Bay State cities and recently made in Providence, these companies are proceeding toward this same plan, together with a number of outside zones varying with the length of line. In only the thickly settled portions of the cities, their new systems amount to either the two-zone or three-zone plan.

It is believed that it will be entirely feasible to establish either one or two concentric fare zone limits in the city of Boston, thus establishing either two or three zones; that a flat initial fare may be charged in any one zone which will include transfer privilege within that zone; that an additional fare (either the same or smaller than the initial fare) may be charged for a ride extending across a zone limit line. This is a zone system considerably modified by the flat fare idea in concession to the practicability of fare collection. While it is open to a great many of the same objections as may be urged against the universal flat fare, nevertheless this is a matter of degree, and the proposed system goes a long way toward making the charge proportionate to the distance traveled. It is flexible in that zone limits may be moved from time to time, the number of zones increased or diminished, and either the flat initial fare or the additional zone limit fare increased or diminished as necessity requires.

HOW TO HANDLE THE FARES

Professor Richey's first recommendation is for a two-zone system for Boston. To fix the zone boundary he considered the distribution of population and of traffic, the cost of service, the relation between initial and zone-line fares, competition and the method of fare collection. A complete check was made of all passengers on board and boarding and alighting in the section between circles with a 3-mile and a 5-mile radius from the City Hall. The map on page 135 shows three possible locations for the zone boundary line, at 3, 4 and 5 miles from the City Hall.

The tabulation on page 137 indicates the amount of the zone-line fare which will be required with initial fares of various amounts in order to produce approximately the same total revenue as various flat fares. Three such tabulations are shown, corresponding to the three possible locations of zone boundary lines. The flat fare which would be equivalent to any initial fare combined with a zone-line fare not shown in the tabulations may be obtained by interpolation, 1 cent of zone-line fare being equivalent to ½ cent flat fare if the boundary be established at the "inner" location, to ⅓ cent if at the "middle" location, or to ⅕ cent if at the "outer" location.

If it should be agreed, Professor Richey says, that it is necessary to include the terminals of the rapid transit lines within the interior zone on account of the difficulty of the collection of an additional fare from passengers on these lines after passing a zone limit, the outer zone boundary may be adopted. However, as only about 13 per cent of the population served reside outside of such boundary, and only about 18 per cent of the total number of passengers ride across such boundary, it appears more equitable to establish the zone boundary line somewhat nearer to the center. He believes that the method of fare collection proposed will make it possible, at no prohibitive expense, to collect a zone-line fare from rapid transit passengers, as well as from those on surface cars, at points much nearer the center—about 3 miles from the City Hall.

The proposed fare-collection plan follows in outline:

Through Surface Car with Fare Box

Such cars to be equipped with fare box and one overhead register.

Outbound: In inner zone passengers prepay or pay-enter the initial fare, with free exit as at present. At zone line, conductor announces zone limit. In outer zone, passengers boarding pay-enter initial fare and receive identification check. All passengers pay-leave either zone-line fare or identification check.

Inbound: In outer zone, passengers pay-enter initial or total fare, according to destination as stated; if total fare is paid, conductor issues identification check. At zone line, conductor announces zone limit and makes inside collection of identification checks or zone-line fares from passengers without identification checks. Zone-line cash and tokens from inside collection are rung up on overhead register. On light routes and during non-rush hours, with loads such that conductor can remember the few local passengers, issuance and collection of identification checks might be omitted. On some heavy inbound trips, it will be necessary to have an extra collector board the car at the zone line and make the inside collection as the car proceeds. The extra collector should return the identification checks to the regular conductor; he should ring up zone-line cash or token collections on the overhead register, and turn over to the regular conductor the amount collected, as evidenced by the register; or, by an alternative plan, he should ring up such fares on a portable cash register, in which case he would retain the amount collected until the close of his day's work. In inner zone, passengers prepay initial fare, as at present.

Through Surface Cars Without Fare Box

Such cars to be equipped with two overhead registers, one for initial and one for zone-line fares.

Outbound: In inner zone, initial fare collection as at present—either in prepayment station or on car, in the latter case the fares being rung up on initial-fare register. At zone line, conductor announces zone limit and collects zone-line fare from all passengers then on car, using zone-line fare register. In outer zone, he collects initial fare from each passenger boarding car, as at present.

INITIAL AND ZONE-LINE FARES EQUIVALENT TO VARIOUS FLAT FARES UNDER PROPOSED BOSTON PLAN

Zone Boundary 3 Miles from City Hall
(51 per cent of total passengers subject to zone line fare)

Equivalent to flat fare (cents)	5	6	7	8	9	10	11	12
Initial fare (cents)	Zone-Line Fare							
4	2	4	....	....	....	....	....	....
5	0	2	4	....	....	....	....	....
6	....	0	2	4	6	....	....	....
7	....	....	0	2	4	6	....	....
8	....	....	....	0	2	4	6	8
9	....	....	....	....	0	2	4	6
10	....	....	....	....	....	0	2	4
11	....	....	....	....	....	....	0	2
12	....	....	....	....	....	....	....	0

Zone Boundary 4 Miles from City Hall
(35 per cent of total passengers subject to zone-line fare)

Equivalent to flat fare (cents)	5	6	7	8	9	10	11	12
Initial fare (cents)	Zone-line Fare							
4	3	....	....	....	....	....	....	....
5	0	3	5	....	....	....	....	....
6	....	0	3	6	....	....	....	....
7	....	....	0	3	6	....	....	....
8	....	....	....	0	3	6	....	....
9	....	....	....	....	0	3	6	9
10	....	....	....	....	....	0	3	6
11	....	....	....	....	....	....	0	3
12	....	....	....	....	....	....	....	0

Zone Boundary 5 Miles from City Hall
(18 per cent of total passengers subject to zone-line fare)

Equivalent to flat fare (cents)	5	6	7	8	9	10	11	12
Initial fare (cents)	Zone-line Fare							
4	....	....	....	....	....	....	....	....
5	0	5	....	....	....	....	....	....
6	....	0	5	....	....	....	....	....
7	....	....	0	5	....	....	....	....
8	....	....	....	0	5	....	....	....
9	....	....	....	....	0	5	....	....
10	....	....	....	....	....	0	5	....
11	....	....	....	....	....	....	0	5
12	....	....	....	....	....	....	....	0

NOTE.—An initial fare, as listed in first column, together with a zone-line fare as listed opposite, will produce practically (variation between 1.6 per cent less and 1.4 per cent greater) the same total revenue as the flat fare shown at top of column, if volume of traffic remains unchanged.

Inbound: In outer zone, conductor collects initial fare and rings up on initial-fare register. At zone line, conductor announces zone limit and collects zone-line fare from all passengers then on car, using zone-line fare register. (See above for possible necessity for extra collectors on heavy inbound trips.) In inner zone, conductor collects initial fare from each passenger boarding car, as at present.

As an alternative, the fare collection on cars without fare box may be by the same method as proposed for cars with fare box, except for the use of the two overhead registers, as described herein.

Rapid Transit Terminals or Other Prepayment Areas at Zone Line

Street Entrance and Exit: Collect initial fare from entering passengers, with free exit, as at present.

Bodily Transfer Between Surface and Rapid Transit and Vice Versa: Passengers in either direction pay zone-line fare in passageway between rapid transit and surface car platforms.

Through Rapid Transit Trains

Stations Inside Zone Boundary: Prepay initial fare, with free exit, as at present.

Stations Outside Zone Boundary: Inbound boarding passengers prepay total fare, or zone-line fare if from surface car by bodily transfer. Outbound boarding passengers prepay initial fare. Outbound alighting passengers pay zone-line fare at exit or at passageway to surface cars. Where paper transfers are used, boarding passengers may present surface car transfer as initial fare, and pay zone-line fare in addition. Alighting passengers may receive surface car transfer on payment of zone-line fare.

Paper Transfers at Zone Line

Transfers from routes in inner zone to routes in outer zone, and vice versa, should be printed on paper of a distinctive color and sold to passengers for the zone-line fare. Such cash would not be registered but accounted for by difference in serial numbers of such transfers issued to and returned by conductor daily.

General Recommendations for Fare Collection

In order to simplify and safeguard fare collection, it is recommended that two forms of metal tokens, representing the initial and the zone-line fare, be sold at all prepayment stations and also at other convenient distributing points. These tokens should not be sold by conductors on cars. Obviously, the zone-line fare token should be larger in diameter than the initial fare token.

It is further recommended that if the nominal initial fare is some amount between 5 and 10 cents, it should be paid either by a metal token or by 10 cents in cash, and that if the nominal zone-line fare is something less than 5 cents, it should be paid by a metal token or by 5 cents in cash, the intent being that conductors shall not be required to make penny change on the cars. This can be accomplished by a proper wording of the published fare schedule, as was done in Cleveland during the period when the nominal fare was less than 5 cents; 5 cents cash was collected from those passengers not provided with tickets.

It is earnestly recommended that all of the present non-prepayment cars be equipped with fare boxes, so as to make them suitable for pay-enter or pay-leave operation. As a temporary measure, proper fixtures may be installed on both the inside and the outside of the bulkhead door post, and a fare box can be hung in either of those positions, the outer position being used in mild weather, and the inner in extremely cold weather when it is necessary to operate with the bulkhead door closed. A short section of the longitudinal seat can be arranged on hinges to fold back to allow space for the conductor's position when necessary to use the fare box inside the bulkhead. It would also be desirable to install mechanical operation for the vestibule doors, so that these can be operated from either position of the conductor. Such changes are entirely practical, it is said, and have been made as emergency measures to convert non-prepayment cars for prepayment operation in a number of cities. The expense of such changes is small compared with the evident advantages of fare box operation.

While at the present time the fare box manufacturing situation is not normal, and one of the two manufacturers of registering fare boxes is at present engaged almost wholly in government work, Professor Richey states: "I have been informed by the other manufacturer that he is prepared to furnish a registering fare box capable of taking dimes, nickels and pennies, registering the total cash amount, as well as two sizes of metal tokens, and registering the total number of each separately. He has recently equipped the Kansas City Railways with such boxes, and he states that he could make delivery of such boxes in any quantity in Boston within about ninety days." The foregoing description of the proposed method of fare collection for the two-zone plan, however, includes a method for use on surface cars which are not equipped with fare boxes, which may be used until such time as all cars can be so equipped.

The total added cost a year from such a method of fare collection, according to Professor Richey, will be $200,000 for a 3-mile inner zone, $135,000 for a 4-mile inner zone and $72,000 for a 5-mile inner zone. To balance this cost would require an increase of considerably less than 1 per cent in the total number of passengers carried. The difference in the total number of passengers carried as between a flat fare and an equivalent two-zone system would, it is said, be without much question nearer 5 per cent. Thus the net gain may be as great as $1,000,000 per year. While it possibly may be greater than that amount, the great uncertainty of such estimates is said to lead to the more conservative prediction of a traffic gain of about 3 per cent, or a net gain of about $500,000 a year.

As the first step toward the ideal system, therefore, Professor Richey recommends that the Boston Elevated Railway territory be divided into two zones by an arbitrary line drawn at a radius of about 3 miles from the City Hall. At the present time, about half the total passengers cross this zone line. It is estimated that an initial fare of 7 cents, with a zone-line fare of 5 cents, making a total fare of 12 cents for a ride extending across the line, will produce nearly the same revenue as a flat fare of 10 cents, which latter appears to be necessary to meet the present cost of service.

Central Traffic Association

Experience with 2000-Penny Book as Substitute for 1000-Mile Book Described—Other Important Actions of Year

THE principal work of the Central Electric Railway Traffic Association during the past year was summed up in the annual report of Chairman A. L. Neereamer, presented at the meeting which was held in Fort Wayne, Ind., on Jan. 14. After speaking of the five regular meetings held during the year and the two extra meetings in June, Mr. Neereamer said, in part:

> During 1917 we had a membership of fifty-one lines representing 4334 miles, and for the year just ended fifty-four lines representing 4432 miles, making an increase of three lines and 98 miles. During that period one line was dismantled, another partially dismantled and one of the larger lines divided into two systems.
>
> Joint and Local Baggage Tariff No. 9, I. C. C. 26, is still in force, although two supplements have been issued during the past year, effective July 25 and Oct. 25. One of these supplements contains the advance in excess baggage rates as allowed by the commission in Indiana. This tariff will have to be reissued in a short time in order to line it up with that of the steam lines.
>
> Joint Passenger Tariff No. 17, I. C. C. 27, covering the interchangeable 1000-mile ticket, was canceled on June 15, by Joint Passenger Tariff No. 19, I. C. C. 29, which covers the interchangeable 2000-penny coupon ticket. This new publication started with nineteen lines, representing 1896 miles. Supplements have added four lines and 551 miles. During the first year of the interchangeable 1000-mile ticket, 5600 tickets were ordered and placed in the hands of the agents. From June 15 to Dec. 31, six and one-half months of the interchangeable 2000-penny coupon ticket, 8000 have been ordered and placed in the hands of the agents, a little more than 1200 per month which, to the writer's mind, demonstrates the popularity of this form of transportation.
>
> Official Classification No. 43 has finally been canceled and its reissue and supplements are being filed for our member companies by R. N. Collyer. Joint Freight Tariff No. 13, I.C.C. 18, covering exceptions to official classification was canceled on June 1 by I.C.C. 22, Joint and Local Freight Tariff No. 14. This publication is participated in by thirty-five lines. Application covering a supplement is now pending with the Interstate Commerce Commission. Official Interurban Equipment Register No. 4, I.C.C. 21, was canceled on Nov. 1 by Official Interurban Equipment Register No. 5, I.C.C. 24, and is participated in by thirty-seven lines. Although a number of lines dropped out of this issue, enough other carriers became party to it to make it a larger publication than before.
>
> Joint Passenger Tariff 18, I.C.C. 28, has been canceled for intrastate traffic in Indiana and Ohio. Application for cancelation interstate has been pending with the Interstate Commerce Commission for a long time and present indications are that this will soon be done and the extremely low rates eliminated. The association will then be in position to start anew and your chairman recommends that the committee having this in charge go over the old publication and eliminate as much as possible unnecessary headline points and stations to which tickets never have been sold. In this way the size of the publication can be reduced without detracting from its value and the expense would be kept down to the minimum.
>
> Several changes have been made in the demurrage rules. Joint and Local Demurrage Tariff No. 3 I.C.C. 19 was canceled by No. 4, I.C.C. 23 on March 27, and the latter publication was canceled by No. 5, I.C.C. 25, on Nov. 4. This publication is participated in by thirty-eight lines. Joint and Local Storage Tariff No. 1, I.C.C. 20, is still in force, although the committee in charge is contemplating a reissue of this tariff.
>
> At the meeting held in November the committee in charge of the official interurban map was instructed to make arrangements for all corrections to be made on the map plates, and at a meeting of the Central Electric Railway Association held in November provision was made for the expense of these corrections. It is expected that this committee will make a full report at this meeting.
>
> For the first time during the history of this organization, death has entered our ranks and called to "That bourne from which no traveler e'er returns" one of our active members, L. W. Henry. Resolutions regarding his death have been presented before this meeting and acted upon, but the chairman is of the opinion that in addition to these resolutions mention should be made of his death in the annual report.

Bureau of Standards Issues Revised Circular on Electrolysis Mitigation

SINCE the now well-known Circular No. 52 of the United States Bureau of Standards on "Electrolysis and Its Mitigation" was published much progress has been made in this field. Consequently a new edition was found necessary and copies of this may be had by addressing the bureau at Washington, D. C. In the revision a rather full discussion of the three-wire method of railway power distribution has been added and the section on pipe drainage has been modified to conform to the latest investigations and observations. On the subject of automatic substations the circular points out that these have now been developed to such a point that they are entirely practicable and dependable for railway use. By making it possible materially to increase the number of feeding points they incidentally produce better electroylsis conditions.

There was no tramway service on Christmas day in a number of cities in Great Britain, and in other cities, including London, the service was very greatly reduced. This was in conformity with the desire of the men to spend as much time with their families on Christmas day as possible.

When a Line Pole Needs a Guy

BY CHARLES R. HARTE
Construction Engineer, The Connecticut Company, New Haven, Conn.

A DIFFICULT LOCATION FOR SUITABLE GUYING

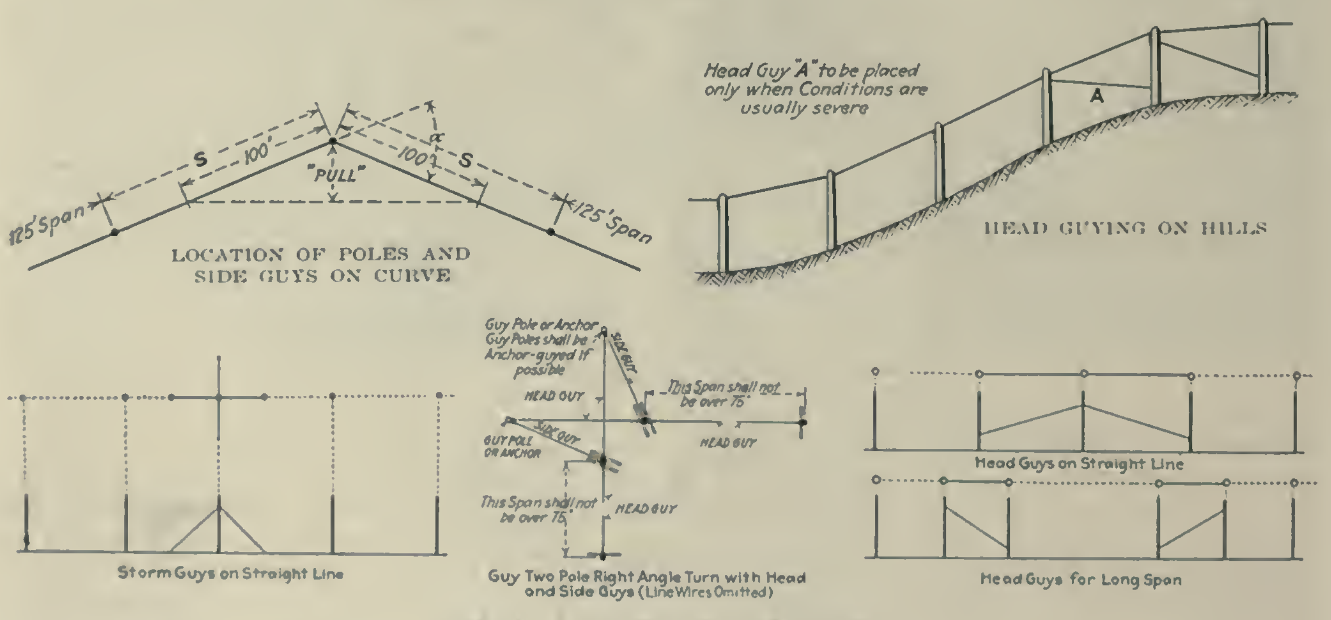
Practice in Line Guying Has Been Standardized by the Telephone, Telegraph and Power Companies, Hence the Author Summarizes Their Experience as a Guide on Electric Railway Transmission Line Construction—The Desideratum is to Keep the Line "Put" Without Using Unnecessary Material in the Guys and Anchors

IN THE issue of the ELECTRIC RAILWAY JOURNAL for Nov. 16, 1918, we examined in detail the subject of pole-line guys. A logical sequel to this is an attempt to answer the question: "When should guys be used?" From the first the Bell Telephone Companies realized the importance, from every point of view, of standard practice in line work, and early developed a scheme of guying. The Western Union Telegraph Company, prior to its brief control by the American Telephone & Telegraph Company, had been somewhat less thorough, but as a result of that control went into more detail than the "A. T. & T.," varying from that company's practice in some respects but not radically. In 1914 the National Electric Light Association received from its sub-committee on overhead construction its monumental report which established similar standards in its field.

Obviously a guy, or some equivalent if conditions bar the guy, should be placed on every pole which may be subject to strains approaching its strength. Such strains may result from the nature of the line, as the pulls at horizontal and vertical angles, or from storms, or from both in combination. Those due to the nature of the line can be calculated readily, but the storm strains are not so easy to determine, since they depend upon the kind and severity of the storms to be anticipated, their direction relative to the line, and the extent to which the line is sheltered—all of which can only be guessed at in the light of previous occurrences—in addition to the known facts of the details of the line itself. The long experience, however, with the signal lines, using this term in the sense in which it is employed in the National Electrical Safety Code, has given a good basis to work on, both as to the lines themselves, and as to the relation between these lines and those of companies using different sizes of conductor.

Considering first the strains due to corners, it is customary to measure the angles in terms of the "pull," so-called, which is the distance from the corner pole to a line drawn between points on the two branches of the line. The Bell companies and the N. E. L. A. measure out 100 ft. on each side, but the Western Union employs 130 ft., which is the standard length of span for their seven to sixty-wire lines. As a result, for a given angle, the Western Union "pull" is three-tenths greater than the value the others use, and conversely, the others find for a given angle a "pull" which is practically three-fourths (actually ten-thirteenths) of the Western Union.

On a paper layout it is a very simple matter to lay off the exact line from which to measure. In the field, unless the adjacent poles happen to be each 130 ft. away, it is not so convenient although there is nothing complicated about the process. It is easy, however, to make a diagram which permits the use of the poles adjacent to the corner pole. If they are approximately equal distances from it one can, by sighting from one of these poles to the other, instantly find a point on their line and opposite the corner pole, and the distances from this point to the corner pole and from the adjacent pole to the corner pole, can be readily measured. The "pull" (on the 100-ft. basis) is then found from the diagram (see page 142) by locating at the left-hand side the distance measured, following this to the right to the inclined line marked with the distance between corner and adjacent poles, and then following the vertical line through that point to the bottom of the chart where the "pull" is read off. For example, if the adjacent poles were 70 ft. from the corner pole and the latter was 30 ft. from the line between the adjacent poles, we find 30 at the left, follow it to the inclined 70, and drop down vertically at 43 which is the "pull."


125' Span
S
100'
"PULL"
100'
S
α
125' Span
Head Guy "A" to be placed only when Conditions are usually severe
A
Guy Pole or Anchor Guy Poles shall be Anchor-guyed if possible
SIDE GUY
HEAD GUY
This Span shall not be over 75'
GUY POLE OR ANCHOR
SIDE GUY
HEAD GUY
This Span shall not be over 75'
HEAD GUY

LOCATION OF POLES AND SIDE GUYS ON CURVE

HEAD GUYING ON HILLS

Storm Guys on Straight Line

Guy Two Pole Right Angle Turn with Head and Side Guys (Line Wires Omitted)

Head Guys on Straight Line

Head Guys for Long Span

SPECIAL PROBLEMS IN LINE GUYING

If the two adjacent poles are not equally distant from the corner pole the correct value for the pull is found by measuring from the middle of the line between them to the corner, and using the average of their distances for the value of the inclined line.

A similar diagram for the Western Union basis of 130 ft. is readily made by remembering that the distance from corner pole to line for any given angle is proportional to the distance from the corner pole to the point through which the line goes. If a diagram is laid off, except as to inclined lines, just like the one shown, the line at an angle of 45 deg., as is the 100-ft. line here, would then be the 130-ft. line. If we start where the horizontal 39-ft. line cuts this and lay off 3-ft. points on each side on the vertical 39 line, the inclined lines through these points will be respectively the 140-ft., 150-ft., etc., lines upward, and the 120-ft., 110-ft., etc., lines downward. By taking the pull 39 ft. on the 130-ft. basis we get the ratio of 3 to 10 between the distance from corner to line and from corner to point fixing the line, and the offsets for that angle will be 36 for 120 ft., 33 for 110 ft., etc.

STRAIN MUST BE OPPOSED BY AN ANCHORAGE OF SOME SORT

Opposed to the strain resulting from the corner we need some form of anchorage, the effective value of which is modified by the angle it makes with the strain, which, except in special cases where it is inclined to an extent which necessitates consideration of that fact, is taken as horizontal. This angle, it will be remembered, is measured by the relation of the "lead," the horizontal distance from the base of the pole to a point on the guy at that level, to the "height," the distance from the base of the pole vertically to the point of guy attachment.

Coming down to "brass tacks" and business, the National Electric Light Association deals with a corner on the basis of its "pull" and the size of the line, cutting down the strain as the pull increases by shortening the adjacent spans, as shown in middle lower diagram above. This is reproduced from the N. E. L. A. Handbook on Overhead Line Construction. The N. E. L. A. rule is to head guy and side guy all corner poles, whether the turn is made on one or more, the side guys on curved lines being installed in line with the radius of the curve at that point.

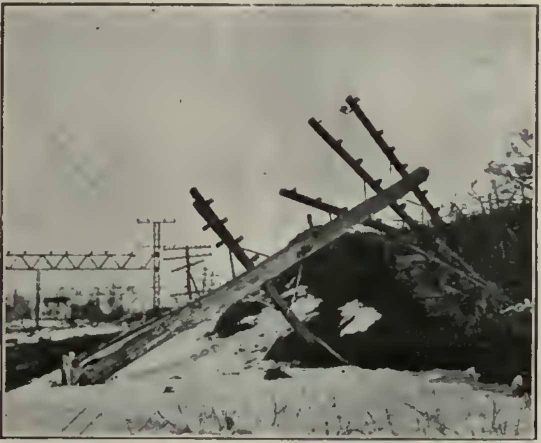
SIDE GUYING HAS BEEN FAIRLY WELL STANDARDIZED

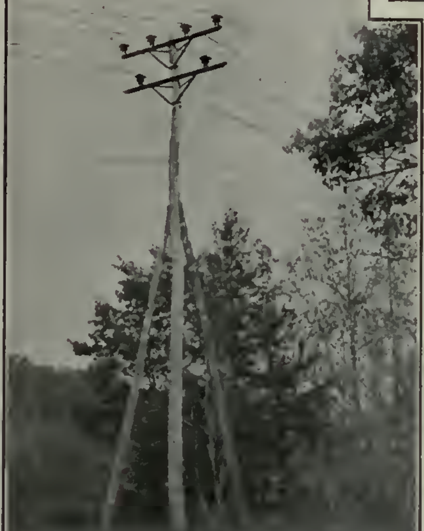
The particular specifications are characterized as covering "construction methods for distributing systems as follows: Mechanically, for spans up to and including 130 ft.; electrically, for street lighting circuits and for constant potential circuits up to and including 6600 volts between adjacent wires on the same crossarm." While such circuits are sometimes of much heavier section, the average line would be of about No. 4 weatherproof wire.

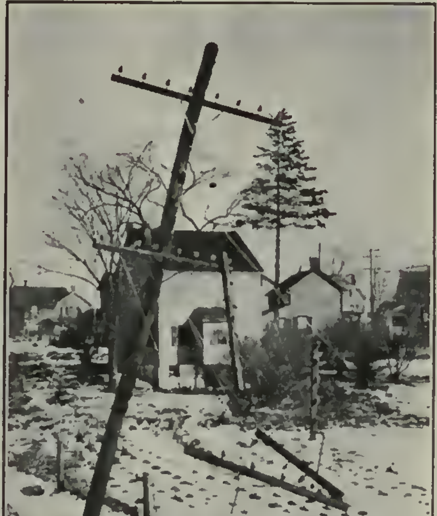
The American Telephone & Telegraph Company calls for side guying in accordance with Table I.

Where the line carries cable as well as open wires an additional 6000-lb.-strand side guy is to be placed, under the conditions shown in Table II.

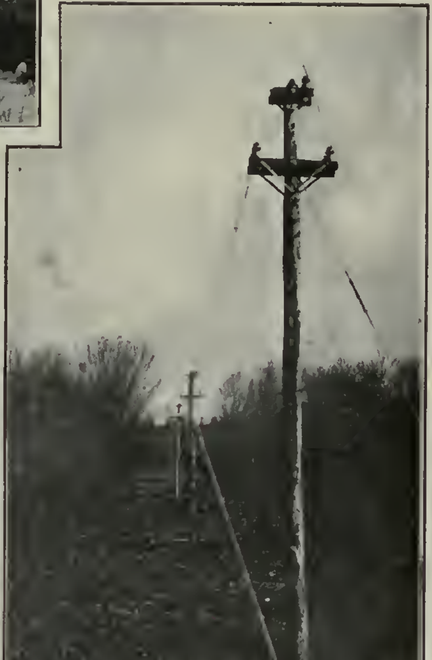
At bottom, left, push brace on a corner pole where a guy could not be installed.
At top, center, a long tangent on which failure resulted from lack of side guys.
At bottom, center, a case where failure resulted from lack of side and head guys. Note the dragging off of crossarms by the pull along the line.







Below, construction involving several forms of guy. Note side guy for corner and head guy from adjacent pole and, on the long tangent, side guy to anchor and head guy to base of pole. As line is on private right-of-way clearance under guy is unnecessary.



This in turn calls for the open-wire equivalents of telephone cables given in Table III, on page 142, in which details of ordinary telephone cable are included. The equivalence is for wind of an indicated velocity of 50 m.p.h. and ⅜-in. of ice on the open wires in one case, and on the cable and messenger in the other, the cable being at the same height on the pole as the open wires, and both weight and wind pressure being taken into account. These values are somewhat lower than those often used, the more usual figures being an indicated velocity of wind of 70 m.p.h. (giving a pressure of 8 lb. per square foot of projected area of conductor and covering) and ice ½ in. thick all around. However, since the same wind and ice values are used on both open wires and cables, the equivalence is substantially as true for the higher values as for the lower ones.

TABLE I—SIDE GUYING, A. T. & T. CO. STANDARD

Number of Wires	Amount of Pull	Kind of Guy or Reinforcement
Ten	Less than 5 ft.	None
Ten	5 to 10 ft.	Ground brace or 6000-lb. strand
Ten	10 ft. or more	6000-lb. strand
Twenty or more	Less than 18 in.	None
Twenty to sixty	18 in. or more	6000-lb. strand
Sixty or more	18 in. or more	10,000-lb. strand
Forty or more	18 in. or more, and lead of guy less than one-fifth height................	10,000-lb. strand
Forty or more	10 ft. or more and lead of guy less than one-quarter height................	10,000-lb. strand

The odd pairs which are listed in the "actual" cables are the tracer pairs which are used for testing and are not counted in giving the "nominal" cable capacity.

As a further guide, for use on joint lines, the American Telephone & Telegraph Company uses these approximate equivalents: A No. 2, 4, or 6 B. & S. gage weatherproof wire is equivalent to two open wires; a No. 0 or 00 wire to three open wires, and a No. 0000 wire to four open wires.

As an example of the application of the tables, if we take the case of a pole which carries forty telephone open wires, one 150-pair nineteen-gage cable and six

TABLE II—SIDE GUYING FOR POLE LINE CARRYING CABLES

Equivalent Number of Wires	Pull	Distance From Cable Guy to Lowest Crossarm Is More Than
10	18 in. to 10 ft.	9 ft.
10	10 ft. to 15 ft.	4 ft.
10	15 ft. or over	2 ft.
20	18 in. to 10 ft.	4 ft.
20	10 ft. or over	0 ft.
30 or more	18 in. or over	0 ft.

No. 00 weatherproofed lighting wires, we have, for the equivalent load in open wires:

Forty open wires..........................	equals 40 open wires
One 150-pair nineteen-gage cable..............	equals 20 open wires
Six No. 00 weatherproof wires..............	equals 18 open wires
Total..	78 open wires

This is practically an eighty-wire line.

The above is on the assumption that the several groups are at approximately the same level. If there was a considerable separation between some of the elements, as would doubtless be the case here because of the lighting circuits, allowance should be made for that fact, and the equivalent value increased or decreased according as the distant member was above or below the position which would be occupied by its equivalent in telephone wires.

It is in the matter of storm guying that, up to comparatively recently, there has been so little of definite rule that one large company, in a confidential letter of instruction to its employees, advised that the location of guys be left to the judgment of the line foreman! The telephone companies, however, go into the matter in considerable detail. They do this because the question is of much importance, both before construction, to insure the integrity of the line, and after trouble, either to prove the sufficiency of the protection against reasonable contingency, or, by showing to the company its insufficiency, to lead to a settlement of any claims out of court rather than after a costly suit has established that fact. Obviously it is no less the engineer's duty to keep his company from fighting a case in which they are bound "to be licked," than to see that such conditions do not arise. It will therefore pay to consider the telephone practice in some detail.

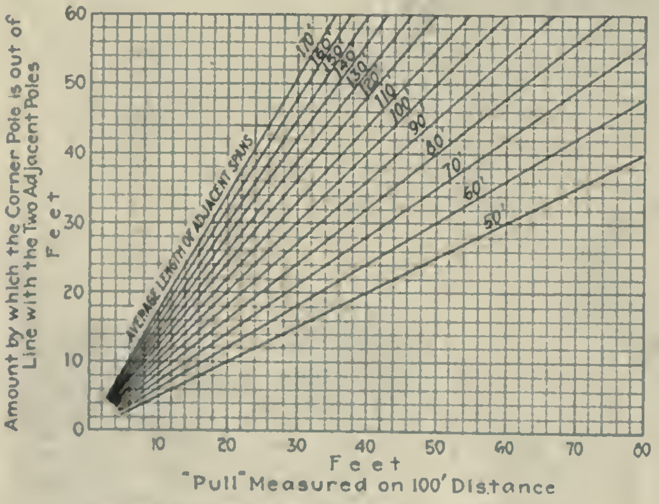


CHART FOR USE IN FINDING CORNER PULL OF POLE LINE

The Western Union practice for angle guys is as given in Table IV.

For lines having an ultimate capacity of more than 12 wires Table V is used.

It should be remembered that the Western Union uses 130 ft. as the basis of measurement of pull, and that the values of 1½, 10, 20, 30, 40 and 50 as given above correspond to the A. T. & T. and N. E. L. A. values of 1.17, 7.8, 15.6, 23.4, 31.2, and 39.0 respectively.

TABLE III—TELEPHONE CABLE EQUIVALENTS IN OPEN WIRES

Number of Pairs Table	Number of Pairs Actual	Maximum Outside Diameter, Inches	Weight per Foot Pounds	Messenger, Pounds Capacity	Rings, Inside Diameter	Equivalent Number of Open Wires
		22 Gage Cable				
25						6
	26	¾	0.97	6,000	2	
30						7
50						8
	51	15/16	1.33	6,000	2	
60						9
	76	1 3/32	1.65	6,000	2	
90						10
100						10
	101	1¼	2.13	6,000	2	
120						12
150						13
	152	1½	2.74	10,000	2½	
180						14
200						16
	202	1¾	4.07	10,000	2½	
240						18
300						20
	303	2 1/16	5.17	16,000	3	
360						22
400						23
	404	2 11/32	6.21	16,000	3	
	505	2 21/32	7.34	16,000	3½	
600						29
		19 Gage Cable				
10						6
	11	21/32	0.81	6,000	2	
15						7
	16	¾	0.98	6,000	2	
25						8
	26	⅞	1.23	6,000	2	
30						9
50						10
	51	1 3/16	2.01	6,000	2	
60						12
75						13
	76	1 ⅜		10		
90						14
100						16
	101	1 ⅝	3.76	10,000	2½	
120						18
150						20
	152	1 29/32	4 78	10,000	2½	
180						22
200						23
	202	2 5/32	5.72	16,000	3	
300						29
	303	2 9/16	7 45	16,000	3½	

TABLE IV—STANDARD GUYING PRACTICE OF WESTERN UNION TELEGRAPH COMPANY

Ultimate Capacity of Pole	Existing Load	Pull	Size and Number of Side Guys
2 wires	2 wires	Less than 25 feet	No guying required
2 wires	2 wires	25 feet or more	1—No. 6 B. W. G. Steel
6 wires	6 wires	Less than 10 feet	No guying required
6 wires	6 wires	10 feet or more	1—4000-lb. strand
12 wires	6 or less	Less than 10 feet	No guying required
12 wires	6 or less	10 feet to 25 feet	1—4000-lb. strand
12 wires	6 or less	26 feet to 50 feet	1—6000—lb. strand
12 wires	7 to 12	Less than 5 feet	No guying required
12 wires	7 to 12	5 to 25 feet	1—4000-lb. strand
12 wires	7 to 12	26 to 50 feet	—6000-lb. strand

TABLE V—WESTERN UNION GUYING FOR HEAVY POLE LINE

Existing Load	Pull in Feet	Ratio of Lead of Guy to Its Height From ¼ to ⅓	⅓ to ½	½ to ¾	¾ or more
10 or less	Less than 5 ft	None	None	None	None
10 or less	5 to 50	1— 6,000	1— 6,000	1— 6,000	1— 6,000
11 to 20	Less than 1½	None	None	None	None
11 to 20	1½ to 30	1— 6,000	1— 6,000	1— 6,000	1— 6,000
11 to 20	31 to 40	1—10,000	1—10,000	1— 6,000	1— 6,000
11 to 20	41 to 50	1—10,000	1—10,000	1—10,000	1— 6,000
21 to 20	Less than 1½	None	None	None	None
21 to 30	1½ to 20	1— 6,000	1— 6,000	1— 6,000	1— 6,000
21 to 30	21 to 30	1—10,000	1—10,000	1— 6,000	1— 6,000
21 to 30	31 to 40	1—10,000	1—10,000	1—10,000	1— 6,000
21 to 30	41 to 50	2—10,000	2—10,000	1—10,000	1— 10,000
51 to 40	Less than 1½	None	None	None	None
31 to 40	1½ to 10	1— 6,000	1— 6,000	1— 6,000	1— 6,000
31 to 40	11 to 20	1—10,000	1— 6,000	1— 6,000	1— 6,000
31 to 40	21 to 30	1—10,000	1—10,000	1—10,000	1— 6,000
31 to 40	31 to 40	2—10,000	2—10,000	1—10,000	1—10,000
31 to 40	41 to 50	2—10,000	2—10,000	2—10,000	1—10,000
41 to 50	Less than 1½	None	None	None	None
41 to 50	1½ to 10	1— 6,000	1— 6,000	1— 6,000	1— 6,000
41 to 50	11 to 20	1—10,000	1—10 000	1— 6,000	1— 6,000
41 to 50	21 to 30	2—10,000	2—10,000	1—10,000	1— 6,000
41 to 50	31 to 40	2—10,000	2—10,000	2—10,000	1—10,000
41 to 50	41 to 50	5—10,000	2—10,000	2—10,000	1—10,000
51 to 60	Less than 1	None	None	None	None
51 to 60	1 to 20		1—10,000	1—10,000	1—10,000
51 to 60	21 to 30		2—10,000	2—10,000	1—10,000
51 to 60	31 to 40		2—10,000	2—10,000	1—10,000
51 to 60	41 to 50		3—10,000	3—10,000	2—10,000
61 to 80	Less than 1		None	None	None
61 to 80	1 to 20		1—10,000	1—10,000	1—10,000
61 to 80	21 to 30		2—10,000	2—10,000	1—10,000
61 to 80	31 to 40		3—10,000	2—10,000	2—10,000
61 to 80	41 to 50		3—10,000	3—10,000	2—10,000

Some Mysterious Car Ailments

Little but Important Troubles That Tend to Keep Equipment Men Interested in Their Work

CONTRIBUTIONS ARE INVITED FROM THE FIELD

Another Remedy for Ice on Control Contacts

IN THE Nov. 16 issue of the JOURNAL there was printed in this department the experience of one railway company with automatic control operated on a storage-battery circuit in extremely cold weather. In the case described the formation of ice on the control contacts insulated them enough to prevent the current at a battery potential of 14 volts from flowing from fingers to segments, making the control inoperative. The trouble was remedied by prick-punching the contact segments so as to raise sharp points on them. The pressure of the fingers caused the ice to break away at these points and allow the fingers to make contact.

On a large Eastern property similar troubles were experienced last winter with automatic control operating on a 24-volt battery and, as a different remedy was used, it will no doubt be of interest now as we are just beginning to experience severe winter weather.

The operating conditions were similar to those in the case mentioned in the previous article. That is, cars in making their regular trip, spent about one-third of the time in the subway and the remainder of the time on the surface, and to make matters worse most of the cars were out of doors all night. On cold days cars, after having been started from the barn without trouble, would frequently be reported "dead" or "losing power" and when they were brought into the carhouse for inspection nothing could be found. At the company's carhouse some of the pits were outside and this afforded the opportunity of examining the controllers reported "dead" without bringing them into the warmer atmosphere of the carhouse.

It had been the practice to use a small amount of grease on the control segments to prevent excessive wear and it was found that the grease mixed with dust and dirt, had formed a black, sticky film on the segments. This in extremely cold weather would harden and insulate the fingers from the segments and make the control inoperative. It was also found in many cases that the segments were coated with a thin film of ice due to the condensation of moisture when the warmer air of the subway came in contact with the cold metal parts.

For awhile attempts were made to improve the operation of the control by running it without grease on the segments, and all contact parts were cleaned at every inspection, but there was little, if any, improvement. It was then decided to try oiling the segments with a thinner oil, and the results were very gratifying. A thin engine oil with a good "cold test" was obtained and, after the segments were thoroughly cleaned of the sticky substance, the oil was applied freely to them with a brush. Although this did not prevent the black film from accumulating it kept the film soft so that the finger plowed through and maintained contact, instead of riding up on the hard black film as was the case before the thin oil was used. The oil also lessened the trouble due to the formation of ice on the segments. Ice will not adhere to a greasy surface as it will to a clean, dry one, and although it may have been formed on the segments, it is easily pushed off by the fingers. This point will be appreciated by automobilists who grease their windshields before driving in a sleet storm, as ice forming on a clean glass is difficult to remove, while that forming on a greasy glass can be easily knocked off with a stick. The use of the oil had a further advantage in making it very easy to clean the contact segments. Where it was usually necessary to use gasoline in cleaning them, the black substance can now be easily wiped off with a cloth. It should be borne in mind that if line potential is used on the control circuits, such free use of oil would probably cause short-circuits due to the collection of dust and dirt on insulating parts. On the other hand, however, very little control circuit trouble is caused by cold weather conditions when line potential is used, and the use of oil as described is for circuits of low potential only.

Sympathetic Behavior of Motors Had a Reason

ON A CERTAIN large property equipped with third-rail and operating trains with cars equipped with line-operated, non-automatic, multiple-unit control, considerable trouble was experienced with motors flashing over. A large percentage of the cars were equipped with non-interpole motors, and a common bus line ran throughout the trains. The third-rails were connected in parallel so that a voltage disturbance on one rail would be communicated to the others. The flashing would frequently occur without any apparent reason and often when one motor of a train flashed over others in the same train would also flash. This led the engineers of the equipment manufacturer, who were co-operating with the company's representatives, to believe that the trouble might be due to voltage fluctuations on the line.

Tests to determine the cause were begun and it was found that sudden voltage variations were occurring. These were due primarily to grounding of motors, flashing of motors and more particularly to intermittent application of current to the motors due to sleet on the third-rail. Further tests on the trains in operation showed that if the voltage was suddenly reduced from 600 to about 400 and restored with the train running at high speed (motors in parallel), the motors would flash over. Other cars in the train and other trains in that particular third-rail zone would sympathetically flash over and blow the main motor fuses.

The engineers decided that the trouble could best be overcome by installing a line switch in the main motor circuit set to drop out promptly whenever an excessive drop in voltage occurred. Accordingly a train was equipped with pneumatically-operated line switches, with their operating coils connected to line through an external resistance. The resistance was so proportioned as to give the coil a range in voltage of from 600 to 400, corresponding to the minimum drop that would cause a flash-over. The pneumatic details of the switch were enlarged so as to provide an especially quick action, as it was, of course, imperative that the switch should be fully opened before the voltage was restored to normal. Results proved that the quick-break switch with large air ports was sufficient to take care of the trouble experienced and accordingly the additional switch was added to each equipment.

Preventing Flashing of Reversers on Multiple-Unit Control Equipments

A CONSIDERABLE number of multiple-unit cars on a well-known railway system were wired up in such a manner that when the master controller was moved entirely to the off position the reverser would break the circuit. There was a point on the controller which would hold the reverser in and allow the motor current to be broken in the controller, but occasionally a motorman would return his controller rapidly to the off position, and if the motors were drawing a heavy current the reverser would flash over. As these reversers were located under a seat in the interior of the car these flashovers caused a flash and flame in the inside of the car and generally the passengers sitting in the seat over the reverser would have their clothing scorched or otherwise damaged.

This condition had existed for some time and the company was seriously considering the installation of a circuit breaker to break the motor circuit and reduce the duty on the reversers. A careful study of the connection of the leads on the reverser, however, showed that the positive finger and the negative finger were adjacent to each other, with only a fraction of an inch clearance between the two fingers. There was thus a difference in potential of 600 volts between two adjacent fingers with but a very small insulating space. It was found that the connections on the reverser could be changed so that the voltage between adjacent fingers would be very materially reduced. This change in the wiring was made and since then the flashing over of the reversers has been entirely eliminated.

An Emergency Stop That Was Not on the Schedule

A CERTAIN large railway system operates multiple-unit trains in elevated service. On one occasion one of its motormen, on arriving at the terminal, reported his train as acting very erratically. He said that while running along with everything apparently working "O.K." the train would suddenly make an emergency stop and force all the passengers to the front end of the cars. On examining the equipment of his train immediately after such a stop, he found the brakes had not been applied but the emergency stop appeared to be due to a sudden reversal of the motors.

The electrician stationed at the terminal rode on the train the next trip but nothing unusual happened. He continued to stay on the train, however, for he said he had a premonition that if he stuck long enough the trouble would occur again. Sure enough, while leaving the opposite terminal of the line and ascending a slight grade there was a sudden flash from the reverser on the head car and all motors on the train were reversed.

A rapid examination was made by the electrician and he found that all the reversers had been thrown to the reverse position with the multiple-unit control switches closed for multiple operation. A thorough examination was impossible at that time and in order to avoid a long detention to passenger service he pulled out the jumper connecting the first and second cars, then with the motorman operating from the first car and himself operating from the second the train completed the remainder of its trip and was then taken out of service for a more careful examination.

At the inspection shop all of the equipment of the train was carefully inspected and tested, but other than that the reversers were burned and smoked up no defects were found that would properly explain the trouble. The jumpers were removed and were given a breakdown test, which consisted in passing a large current through the various wires and connections. This test was also met satisfactorily. The electrician who had helped bring the train in off the road insisted on making another inspection of the equipment, as he felt there must be some obvious cause for the trouble. A small black spot was found on the insulation in the head of the jumper which had been removed from between the first and second cars. This jumper was then entirely dismantled and it was found that the insulating compound inside the jumper head was cracked and that a strand from the positive battery train line wire had broken and was projecting through this crack and touching the reverser operating wire. The twisting of the jumper as the train passed around a curve had caused the contact to be made and the throwing of the reversers had caused the trouble.

While trouble of this particular nature was somewhat uncommon, some precautions in filling the jumper heads with the insulating compound were considered advisable. It was found that by forcing the compound into the heads under considerable pressure small interstices were more properly filled and there was less danger of the compound cracking away from the insulating head. To prevent air bubbles from forming in the compound inside the head, two holes were drilled in the casting. One was used for filling and the other allowed the air to escape readily.

Some Emergency Special Work Construction

Indianapolis Company Utilizes Acetylene Cutting and Thermit Welding in Building Up Curve Crosses

By THOMAS B. McMATH
Engineer of Maintenance of Way, Indianapolis Traction & Terminal Company, Indianapolis, Ind.

THE maintenance-of-way department of this company has found it necessary to make emergency renewals of girder rail curve crosses and frogs, and has been very successful in making a fairly good-looking and serviceable job without any machine-shop work. The only tools used were an acetylene cutting torch, a thermit welding outfit and an Atlas track grinder.

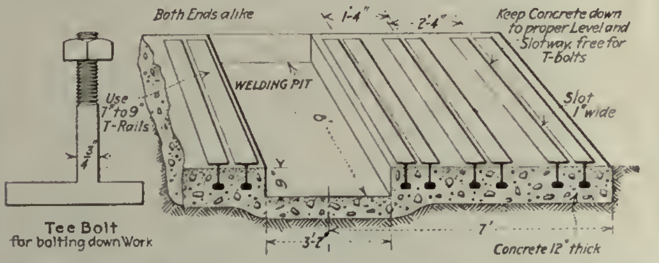

Both Ends alike
1'-4"
2'-4"
Keep Concrete down to proper Level and Slotway free for T-bolts
WELDING PIT
Use 7" to 9" T-Rails
Slot 1" wide
Tee Bolt for bolting down Work
3'-2"
7'
Concrete 12" thick

FIG. 1—THERMIT WELDING BED, 14 FT. LONG, 8 FT. WIDE

Made of concrete flush with ground. Old rails set with bases projecting 1½ in. above concrete. All rail bases set to perfectly level plane surface. Holding-down bolts used to bolt parts to be welded.

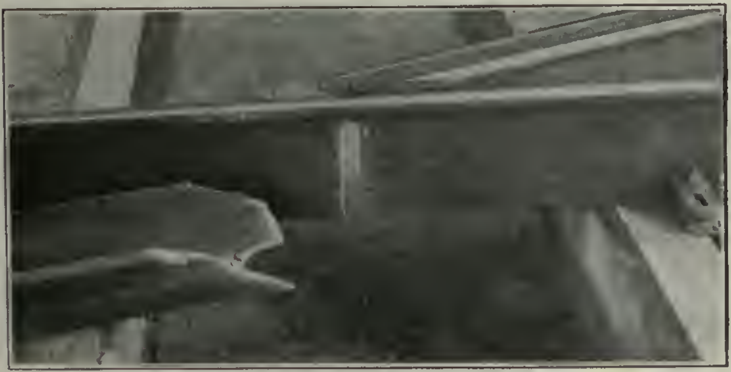


FIG. 2—THROUGH RAIL AND ABUTTING ENDS OF ARM RAILS CUT READY FOR WELDING.

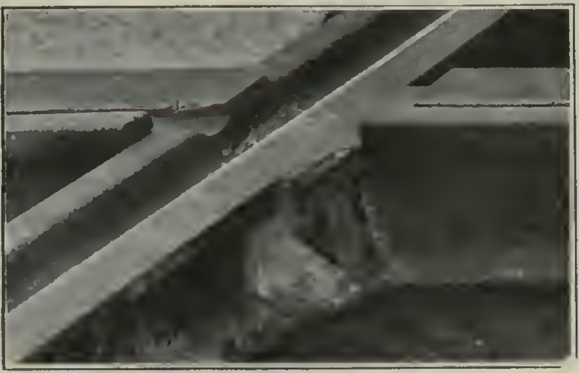


FIG. 3—"JUMP" INTERSECTION WELD COMPLETE

After making a few welds and finding the operation a success, we built a concrete bed for doing such work. This proved to be very convenient and insured the making of curve crosses true to angle and surface. Fig. 1 shows the welding bed. As we use thermit for all combination joints we do all such work on this same bed.

In fabricating a curve cross, we first make a template to correspond with the ball of the rail of the desired cross. The edges of the template that correspond with the gage line are painted red. In laying out the template we take as the through rail the one having the maximum traffic. This is bent to the proper curvature and bolted to the welding bed with the point of intersection over the pit. The rail for the intersecting arms is first bent accurately to the proper radius and then the pieces are cut of ample length to make the arms.

The abutting ends of the arm rails are coped as accurately as possible by means of an acetylene cutter, but this coping is at best a rough approximation. The guard of the through rail is next cut by means of the torch to permit the arm on the guard side to come within about an inch of the gage of the through rail. The through rail is then cut away for a length of 2 in. through the base and web up as far as the bottom of the guard. The photograph reproduced in Fig. 2 shows the job at this stage. One of the coped arms is shown lying on its side to indicate the general shape after coping. The other arm is in its final position. It will be noted that the webs are not in contact, but the weld will include all webs, although they are separated by not less than a half inch. The coped arms are adjusted to the template and are firmly bolted to the bed by U-washers and T-bolts as shown.

The openings are now all filled with wax and the wax is molded to the shape of the desired weld. The wax mold must be extended under the bearing parts of the intersecting rails to provide support for the load, and the weld must extend under the acute-angled points so as to support them. The wax when worked slightly warm is not at all difficult to handle or to work to the required shape.

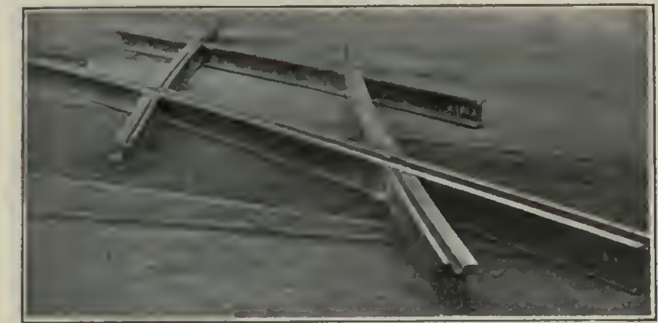


FIG. 4—VIEW OF A COMPLETED CURVE CROSS

We have found a small trowel and a farrier's knife to be the best tools for working the wax pattern into final shape. By knowing how much the wax weighs before starting and how much it weighs after the pattern is finished, it is easy to determine just how much thermit is required.

The flask is made up of four pieces of sheet iron cut at the ends to the shape of the rail. This flask must extend down 4 in. below the base of the rail and must permit 4 in. of sand to intervene between the flask and the weld. The sand used must be silica sand with sufficient fire clay added to make it tamp to a solid mass. It is not necessary to give any details of the thermit welding process here as these are so well known. After the pouring operation the frog should be allowed several hours to cool before removing the sand.

Most of our frogs take about 36 lb. of thermit and we find it most desirable to use two small crucibles rather than one big one. The frog is finished by grinding the tread of the rails if necessary and by grinding out the flangeway crossing.

Fig. 3 shows a close-up view of a finished intersection. The cross shown here, however, is for a "jump" or unbroken main line, with wheel opening for 4½-in. tread wheels. Such a weld will cost some $30 or $40 excluding the rail cost. We have had to make some thirty of these frogs, and we have had only two that we considered "missed," and even these were usable. A frog of this kind can be turned out in two days, or even more rapidly if conditions are such that a more rapid construction is required. Fig. 4 shows a view of a finished crossing.

Our men are intelligent laborers educated on our own work. With about three days' instruction from the manufacturers of the thermit, these men have gradually acquired their education with the acetylene cutter. They had had some experience with it and with the grinder before they began making frogs.

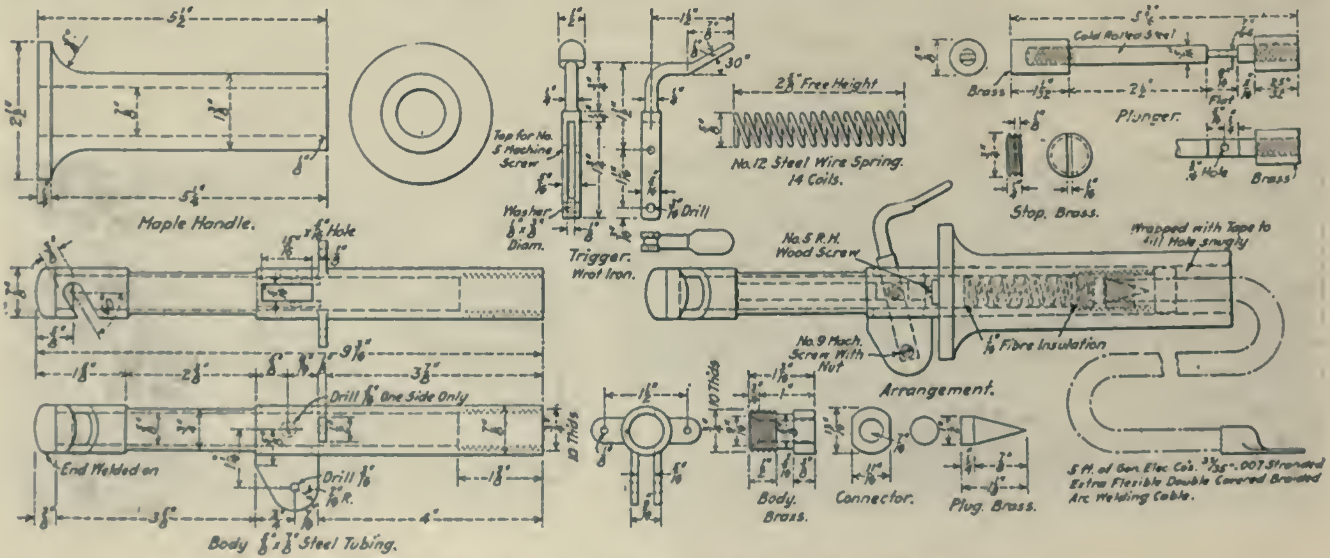
During these strenuous times when it is difficult to obtain special work, and when the cost is so great, we find this home manufacture to be advisable to enable us to tide over till normal conditions return. If the maintenance-of-way department were to order repair renewals sufficiently in advance to have them on hand when needed there would be too much money tied up in the storage yard.

Home manufacture permits one to hold on to the old job until it is gone and still be able to supply only the pieces wanted without tying large amounts of money in the supply yard. We do not know how long this kind of work will last, but we have had it in use for several months and have had no indications of failure.

Selecting Electrodes and Holders for Electric Arc Welding*

Definite Characteristics for Electrodes Are Being Studied and Marked Improvement Is Expected

AT PRESENT the question of electrodes for arc welding is in such a state of development that it is very difficult to set forth any definite data. Various treatments are being applied to electrodes of many kinds. Special electrodes with varying compositions are being made up and their welding characteristics are being studied. No doubt in the near future some definite information will be available as to the proper compositions of electrodes for various operations.



CONSTRUCTION DETAILS OF ONE TYPE OF ELECTRODE HOLDER

Wire for metallic arc welding must be of uniform homogeneous structure, free from segregation, oxides, pipes, seams, etc. The commercial "weldability" of electrodes should be determined by means of tests by an experienced operator, to demonstrate that the wire flows smoothly and evenly through the arc.

The following list indicates the maximum range of the chemical composition of bare electrodes for electric welding in connection with mild steel: Carbon, trace up to 0.25 per cent; manganese, trace up to 0.99 per cent; phosphorus, not to exceed 0.05 per cent; sulphur, not to exceed 0.05 per cent; silicon, not to exceed 0.08 per cent. The composition of the mild steel electrodes, commonly used, is around 0.8 per cent carbon, manganese not exceeding 0.05 per cent, and only a trace of phosphorus, sulphur and silicon.

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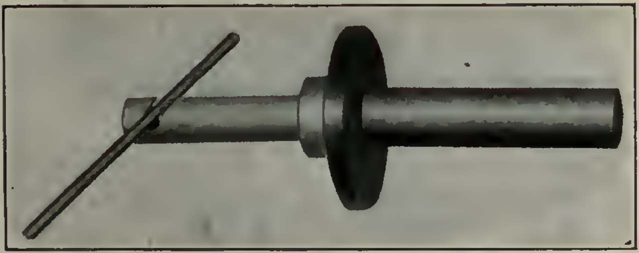
*From 1918 report of committee of Association of Railway Electrical Engineers.

The ordinary sizes required are $\frac{3}{32}$ in., $\frac{1}{8}$ in., $\frac{5}{32}$ in. and $\frac{3}{16}$ in., with only a small demand for the $\frac{3}{32}$ in.

The following table will serve to estimate the amount of wire in pounds required per operator:

Size of Bare Mild-Steel Electrode, In.	Actual Size, Inch	Length, Inches	Current Used, Amp.	Thickness of Work	Time to Deposit Seconds	Weight Deposited Pounds per Hour
$\frac{3}{32}$	0.0925	12	55	$\frac{3}{32}$ in. min.	63	1.3
$\frac{3}{32}$	0.0925	12	65	$\frac{3}{16}$ in. max.	53	1.5
$\frac{1}{8}$	0.1259	12	80	$\frac{3}{16}$ in. min.	67	1.9
$\frac{1}{8}$	0.1259	12	125	$\frac{3}{8}$ in. max.	60	2.5
$\frac{5}{32}$	0.1621	12	100	$\frac{3}{16}$ in. min.	98	2.5
$\frac{5}{32}$	0.1621	12	135	$\frac{1}{4}$ in. min.	87	2.9
$\frac{5}{32}$	0.1621	12	155	6x6-in. frame	75	3.3
$\frac{3}{16}$	0.1865	12	165	$\frac{3}{8}$ in. min.	82	4.0
$\frac{3}{16}$	0.1865	12	175	6x6-in. frame	71	4.6
$\frac{3}{16}$	0.1865	12	200	6x6-in. frame	64	4.8

The weight deposited for pound per hour is the amount of metal that could be deposited in one hour if it was possible to maintain the arc continuously without interruption for this period. In actual practice, however, it has been found that an operator will keep the arc going approximately 50 per cent of the time on average work, the remainder of the time being used in cleaning the metal, changing electrodes and preparing and handling the work.


SIMPLE, LIGHT TYPE OF ELECTRODE HOLDER

COATED ELECTRODES PREVENT OXIDIZATION

A coated electrode is an electrode which has had a coating of some kind applied to its surface for the purpose of improving the metal in the weld by totally or partially excluding the atmosphere from the metal while in a molten state when passing through the arc and after it has been deposited. By the employment of such a coating the use of electrodes of special alloy steel has been made possible. For example, manganese steel, carbon steel, nickel steel, vanadium steel and tungsten tool steel have all been deposited successfully with the metallic arc.

Until recently there was only one kind of a coated electrode in commercial use, which is commonly known as the "quasi-arc" electrode. This electrode gives some wonderful results, but owing to its cost its use has been limited in most cases to special high-grade steels. A cheap simple coating not only for the special steels but also for the commoner mild steel electrodes as well has always been needed, not only to improve the metal in welds made with the present grade of welding wire but also to make possible the use of a better grade of welding wire for some of the more important operations. Progress in this direction is being made.

An electrode holder should be designed to hold the electrode firmly in order that a good contact will be provided for the flow of the current between itself and electrode.

The holder for metallic electrode welding should be designed to permit the changing of electrodes with the least possible delay. It is also important that at least 5 ft. of the cable extending from the electrode holder be extra flexible, in order that an operator can readily change the angle of the electrode (with relation to the work) without having to twist a stiff cable. An operator's hand should be as free to move as that of a painter, if he is to accomplish his work properly.

There are many designs of holders on the market which are satisfactory, one of which is shown in an accompanying illustration. Holders for carbon arc welding where a heavy current is used are necessarily much larger than those used for metallic arc welding. Another simple, light and easily operated holder is shown in another illustration. This consists of a clamp designed to avoid overheating and to protect the operator's hand.

Holders for carbon arc welding should be designed to grip carbons of various sizes. The holder for carbon arc welding is two or three times as long as that required for metallic arc welding to permit the operator to be sufficiently far from the work. A fiber disk is provided also between the carbon and the handle to keep the heat of the arc away from the operator's hand.

1918 Fires Have Their Lessons for 1919

DURING the year just closed many fires were caused by carelessness in burning leaves, brush and general trash. Electric railways were not free from loss due to this cause. The following information regarding 1918 fires is given by the Fire Underwriters Electrical Bureau and is cited as proof of the reality of this hazard.

Fire occurred on April 7, 1918, at 6.30 p.m., at the plant of the Elevated Railway, Somerville, Mass. The cause of the fire as given in a statement of the general adjustment bureau and the sworn statement of the assured was the burning of grass in close proximity to a wooden building. The loss amounted to $300,000. Fire occurred on April 6, 1918, at 1.10 p.m., in the frame carhouse occupied as a storage house for out-of-season cars by the Ithaca (N. Y.) Traction Corporation. This carhouse was located outside the city limits. The fire was caused supposedly from burning grass, as fires had been noticed near by on the day of the damage. The loss paid was $27,000. On Nov. 8, 1918, a fire is reported to have occurred on the property of the street railways of Augusta, Ga. The possible insurance loss was $100,000. The fire is said to have been caused by a spark from burning trash which ignited some combustible material near by.

Park properties and outlying carhouses and shops are particularly exposed to the hazards of fire from the burning of grass, leaves, brush, etc., and from the flying sparks due to the careless burning of trash. The remedy, of course, is to keep leaves, high grass and brush well away from buildings, to burn trash only in wire-mesh covered receptacles, and to store all trash which cannot be immediately removed in covered bins well away from buildings.

Snow Sweepers Made from Open Cars

Emergency Conditions Made Unusual Procedure Necessary—Cost Was Less than $900 Per Sweeper

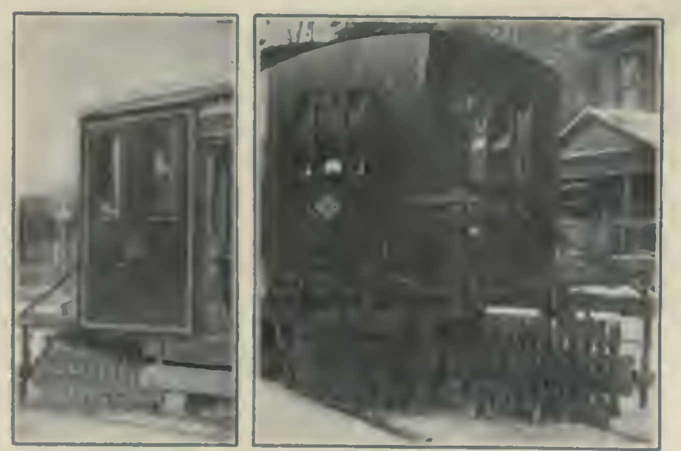
By J. W. Hulme
Superintendent of Equipment International Railway Company, Buffalo, N. Y.

THE loss of four snow sweepers in a carhouse fire which occurred on this property early last spring made it necessary to provide the same number of equipments before the present winter set in. As the car builders could not give absolute assurance that they could make deliveries of new sweepers early in the fall, on account of the scarcity of labor and the difficulty in securing material, the company decided to equip some open cars as snow sweepers. The writer has always felt that a scheme of this kind could be worked out practically and would enable the rolling stock to be used to better advantage than otherwise.

It was decided to use four fourteen-bench cars which operate on the belt lines of the Niagara Falls division of the International Railway. These open cars are of double-truck type and are equipped with four GE-57 three-turn motors each. The cars weigh enough to insure good tractive effort, a necessary condition in any snow sweeper. The overhang of the platform on this type of open car is very small, making it possible to install the sweeper on the front end and still leave ample clearance on all curves.

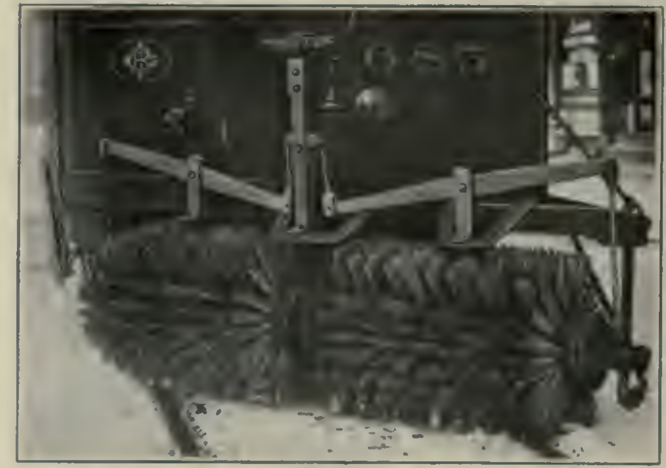
In order to minimize the cost of converting the car from open car service to a snow-fighting unit and back again it was decided not to alter the bulkhead or bonnet of the open car, but merely to remove the vestibule and dasher. Of course the location of the controller and engineer's valve had to be changed.

The construction decided upon is shown in the accompanying photographs. The cab is portable and is built up in five sections, as follows: The roof, which fits over the open car bonnet, the two sides and the two sections of which the front is composed. The broom is supported by a triangular frame made of ½-in. x 5 in. x 5 in. angle iron, and it is bolted on top of the two side sills. In order to stiffen the apparatus and eliminate vibration a 1-in. truss rod was run from the front end of the framework supporting the broom and extended back to the center of the car.



DEVIL-STRIP SIDE OF VESTIBULE AND SWEEPER, AND FRONT OF OPEN CAR EQUIPPED WITH BROOM FOR SNOW SWEEPING

The broom is driven by a modern-type ventilated 60-hp. motor, being direct connected with it by means of shafts and bevel gears. This drive was used to obviate the chain troubles which so frequently occur with chain-driven brooms. A first-class motor was selected for the drive because experience has shown that delays and tie-ups are often due to the use of obsolete types of motors for the broom drive. To permit lowering of the broom as the rattan wears out, a set of levers is provided with control from the cab through an adjusting screw. This is turned by means of a hand wheel with gear and chain connections. The controller and engineer's valve for the use of the motorman who operates the car is located back of the front window on the devil-strip side of the car. This location insures that the motorman will have a clear view of the track ahead when the broom is in operation and will not be blinded by the snow. At the same time the man who operates the broom is able to look out of the other front window to see where he is delivering the snow.



CLOSE-UP VIEW OF BROOM AND LEVERS, SHOWING CHAIN CONNECTION TO ADJUSTING HAND WHEEL

The cost of equipping the car exclusive of the motor and controller for operating the broom was less than $900. Since the cabs are built in portable sections the cost of converting at the end of each season will be less than $30 per car. Up to date we have not experienced any severe snowstorms but we have had sufficient opportunity to assure us that the use of an open car as a snow sweeper is entirely practicable. The motormen, conductors and broom operators are greatly pleased with this reconstructed equipment. Heaters are installed in both the front and the rear end cabs for the comfort of the crews.

In paying a tribute to the service of women conductors in Leeds, England, J. B. Hamilton of the tramways committee said that the employment of women had enabled the committee to maintain a service which, if not altogether adequate, had met the convenience of the public fairly well. It had been found, however, that with women the same standard of regularity cannot be obtained as with men and this increased the possibility of interruptions to service above what they otherwise would have been.

Supreme Court Decides D.U.R. Case

Says City Could Have Ordered Tracks From Street After Franchises Expired But Cannot Compel Company to Continue Business at Loss

A DECISION of importance as bearing on the right of public service corporations to a reasonable return on their investments was handed down by the United States Supreme Court on Jan. 13 by a 6 to 3 vote, in the case of the Detroit United Railway against the City of Detroit.

The case came up on appeal from the District Court for the Eastern District of Michigan, which had dismissed proceedings instituted by the railway company to restrain the enforcement of a city ordinance which sought to fix the rate of street car fares in Detroit. This ordinance (see footnote*) was passed by the City Council after it had turned down petitions from the company for permission to increase its fares.

It was contended by the company that the rates sought to be established were confiscatory and prevented the company from earning a fair return on its investment. The city authorities challenged this contention. The district court in dismissing the proceedings held that the remedy of the company was to abandon its service and take its property from the streets, and that the exception of the fifth section of the ordinance saved the company's contract rights from impairment.

In its decision rendered by Justice Day, the United States Supreme Court reversed the decree of the district court with costs and ordered a new trial. Justices Clarke, Holmes, and Brandeis dissented.

The Court holds that: "There can be no question that it was within the city's power to compel the company as to its non-franchise lines to remove its tracks from the streets of the city. This was settled in *Detroit United Railway Company* vs. *Detroit*, 229 U. S. 39. The city did not do so. Instead of taking such action it passed the ordinance in controversy, providing for the continued operation of the company's system." Where, however, it required certain duties of the company the latter was entitled to make a reasonable return upon its investment. Hence the District Court should have heard the case on its merits.

COMPANY ENTITLED TO A REASONABLE RETURN

On this point the Court said:

"The allegations of the bill, which for the present purposes must be taken as true, are ample to the effect that the enforcement of this ordinance will result in a deficit to the company. We cannot construe the exception of section five, having reference to existing franchise contracts, in such way as to modify the requirements of section four which in explicit terms fixes the fares for trips over two or more lines whether franchise lines or not, and limits the maximum fare without charge for transfers. This must be read in view of the definition of a continuous trip in section five as meaning a journey from one point to another point in the city whether the same is made on one car line or by means of transfers from car to car or from line to line. The exception in section five can have no further effect consistently with the other provisions of the ordinance, particularly section four, than to regulate fares where trips are wholly upon franchise lines.

"A principal ground upon which the bill was dismissed by the District Court was the view of the learned judge that the power to compel the company to remove its tracks from the streets involving the non-franchise roads included the right to fix terms of continued operation upon such lines, whether remunerative or not. We cannot agree with this view. In our opinion the case in this respect is ruled in principle by *Denver* v. *Denver Union Water Company*, 246 U. S. 178. In that case the franchise of a water company had expired, and the city might have refused the further use of the streets to the company. Instead of doing this it passed an ordinance fixing rates and requiring certain duties of the company. We held that in that situation the company was entitled to make a reasonable return upon its invest-

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**An Ordinance* to fix and establish maximum rates of fares and charges which may be exacted and received by persons, corporations, or partnerships operating street railways for the carriage of passengers within the City of Detroit, and to fix a penalty for the violation thereof.

It is Hereby Ordained by the People of the City of Detroit:

Section 1. No person, partnership or corporation operating a street railway on the streets of the City of Detroit, for the carriage of passengers for hire, shall charge more than five cents for a single ride, or six tickets for 25 cents, per person for one continuous trip within the city over any line which is now operated or shall hereafter be operated without a franchise fixing the rate of fare.

Section 2. No such person, partnership or corporation shall charge a higher rate of fare upon any line now or hereafter operated under a franchise contract than is fixed by such franchise.

Section 3. Between the hours of five and six-thirty a. m. and four forty-five and five forty-five p. m. tickets in strips of eight for twenty-five cents shall be sold on all cars on all lines except where such sale would be contrary to the terms of a franchise contract, which tickets shall entitle the holder to the same rights between said hours as the payment of a five cent fare would.

Section 4. Where a trip is over two or more lines, whether franchise lines or not, the maximum fare shall be five cents, and no transfer fee shall be exacted which raises the total charge to more than five cents or six for 25 cents.

Section 5. A continuous trip means one journey from point to point within the city, whether the same is made upon one car or one line or by means of transferring from car to car or from line to line. Each such person, partnership or corporation, and the officers, agents, servants and employes thereof, shall, upon demand, furnish proper transfers to carry into effect the provisions of this section. The provisions of this Ordinance shall not be construed as an attempt to impair the obligation of any valid contract, but shall apply to and givern all such street railway passenger traffic in the city, except where the same is governed by the provisions of such contract.

Section 6. Any such person, partnership or corporation which shall violate the provisions of this Ordinance, or shall attempt to do so, and any officer, agent, servant or employe who shall order or direct any such violation or attempted violation of the provisions of this Ordinance, shall be guilty of an offense, and upon conviction shall be fined not to exceed five hundred dollars, or imprisoned in the Detroit House of Correction for not to exceed ninety days, or shall be both fined and imprisoned in the discretion of the court, for each violation.

Section 7. This Ordinance is passed for the public welfare in the case of an emergency involving the peace, health and safety of the people of the city, and it is ordered to take immdiate effect. It may be amended or repealed at any time by the Common Council of the City of Detroit. Unless so amended or repealed it shall remain in force for one year from August 9, 1918.

ment. So here, the city might have required the company to cease its service and remove its tracks from the non-franchise lines within the city. Instead of taking this course the city enacted an ordinance for the continued operation of the company's system, with fares and transfers for continuous trips over lines composing the system whether the same had a franchise or not. This action contemplated the further operation of the system, and fixed penalties for violations of the ordinance.

"By its terms the ordinance is to continue in force for the period of one year, unless sooner amended or repealed. This was a clear recognition that until the city repealed the ordinance the public service should continue, with the use of the streets essential to carry on further service. Within the principles of the *Denver* case this service could not be required without giving to the company, thus affording it, a reasonable return upon its investment. In the *Denver* case we said: 'The very act of regulating the company's rate was a recognition that its plant must continue, as before, to serve the public needs. The fact that no term was specified is, under the existing circumstances, as significant of an intent that the service should continue while the need existed as of an intent that it should not be perpetual.'

"In the present case the service upon the terms fixed in the ordinance is continued for a year, the city reserving the right to repeal the ordinance at any time.

"It is clear that the city might have taken a different course by requiring the company to remove its tracks from the non-franchise lines, it elected to require continued maintenance of the public service; doubtless because it was believed that it was necessary in the existing conditions in the city to continue for a time at least the right of the railway company to operate its lines. This amounted to a grant to the company for further operation of the system, during the life of the ordinance. For this public service it was entitled to a fair return upon its investment. Elements to be taken into consideration in valuing the property of the company in estimating a fair return are not involved in this case. If the allegations of the bill are true, and for present purposes they must be so regarded, the continued operation of the railroad system of the company upon the fares fixed in the ordinance will result in a deficit, and deny to the company due process of law within the meaning of the Federal Constitution.

"As rates of fare are fixed on some of the existing franchise lines at 5 cents without transfers, it would follow as to continuous trips over such franchise and non-franchise lines, such trips comprehending much of the transportation required, the latter lines would be without compensation for the service rendered. Furthermore, when a continuous trip begins on a non-franchise line and is over a franchise line and a non-franchise line, the former having the right to charge five cents for a trip over it, the effect would be to impair the obligation of the franchise contract. *Detroit United Railway v. Michigan*, 212 U. S. 252.

"In our view the allegations of this bill for the purposes of the demurrer sufficiently alleged violations of the Constitution of the United States in the action of the city in passing and enforcing the ordinance in controversy. The District Court should have entertained the bill, heard the application for a temporary injunction, and proceeded to a hearing and determination of the case in due course."

DISSENTING OPINION

In the dissenting opinion, presented by Justice Clarke, it was held that the ordinance did not require the company to operate its franchise lines at a loss, but it was an offer to the company of a right to operate its lines in the non-franchise streets, in which it had no rights, in conjunction with its other lines at what was alleged to be a non-compensatory rate for the entire system. The opinion of Justice Clarke also quoted, as applicable to the case, the language which Justice Holmes used in a dissenting opinion in the *Denver* case, already mentioned, as follows: "In view of that right of the city, which, if exercised, would make the company's whole plant valueless as such, the question recurs whether the fixing of any rate by the city could be said to confiscate property on the ground that the return was too low. . . . The ordinance of the city could mean no more than that the company must accept the city's rates or stop—and as it could be stopped by the city out and out, the general principle is that it could be stopped unless a certain price should be paid."

Some Additional Track Statistics

SINCE the publication of the statistics on new track constructed and track rebuilt in the statistical issue of January 4, reports have been received from seven additional railways as follows:

		New Single Track Mileage			Miles of Track Rebuilt	
Name of Railway	State	City Track	Interurban Track	Electrified Steam Road	City Track	Interurban Track
Bay State Street Ry.	Mass.	1 80			4 14	
Galveston-Houston Electric Ry.	Texas		0 76			
Houston Electric Co.	Texas	0 30				
Illinois Light & Traction Co.	Ill.			..	0 76	
New York Connecting R. R.	N Y			10 6		
Philadelphia Rapid Transit Co.	Pa	1 49	7 16		14 77	0 12
St. Paul Southern Electric Ry Co.	Minn.		..	.		9 00
Total		3 59	7 92	10 6	19 67	9 12

With these figures added to those previously published the total mileage for new electric railway track built in 1918 becomes 325.33, the electrified steam line mileage 286.3 and the total new electric mileage 611.63. The revised mileage of track rebuilt is 184.22.

Report on Tramways in Chosen, Corea

For the fiscal year ended March 31, 1917, according to the latest report of the Railway Bureau of the Government General of Chosen (Corea), the light railways and tramways opened to traffic totaled 84.4 miles, while those not yet open totaled 134.6 miles. The result of traffic on the operating lines was said to be very good. Private lines already in operation amount to 32.6 miles, while those not yet worked cover 34.7 miles. Since 1914 an annual subsidy sufficient to insure the payment of 6 per cent on the paid up capital, in case the net profit does not reach this amount, has been allowed to companies planning to lay down and work light railways, so as to encourage the development of the work.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

St. Louis Tax Adjusted

Agreement Reached Between City and United Railways for Payments Since Recent Court Decision

An adjustment of the United Railways mill tax suits, amounting to $2,300,000, was reached on Jan. 11 at a meeting of the Board of Estimate and Apportionment of St. Louis, Mo., composed of Mayor Kiel, City Comptroller Louis Nolte and Louis P. Aloe, president of the Board of Aldermen. Charles H. Daues, city counselor, represented the city, and Thomas H. Francis the United Railways.

PAYMENTS IN INSTALLMENTS

The United Railways agreed that it would pay every dollar that it owes the city in mill taxes, including both principal and interest, and, also, a judgment against the St. Louis Transit Company for about $250,000. The obligations are to be paid in ten installments, with interest, amounting to approximately $250,000 a year. The company also binds itself to pay the mill tax in the future without contest as it falls due.

The company, it was stated, would go before the Circuit Court and contest judgment.

On April 4, 1903, a measure known as the mill tax ordinance became effective. This ordinance provided for a license tax of 1 mill per passenger on street railways doing business in St. Louis. The United Railways from the very beginning contested the validity of this tax, and litigation between the city and the company ensued, which ended, in so far as the original cases were concerned, by a decision of the Supreme Court of the United States in 1916 in favor of the city. As the result of this thirteen years' litigation the United Railways Company paid into the treasury of the city approximately $1,800,000. No tax has since been paid under the ordinance.

ANOTHER SUIT WAS PROPOSED

Immediately upon the final determination of the 6-cent fare case by the Supreme Court the Mayor instructed the law department to proceed to collect, if possible, the balance of the mill tax, not in judgment, and which amounts, in round figures, with interest, to $2,500,000. Suit for the major portion of this amount has been pending awaiting the fate of the rate case and was also passed awaiting the result of franchise compromise ordinances and settlements which were being suggested and proposed from time to time. Accordingly, the city counselor a few days ago made demand upon the company to file its answer in these cases so that steps could be taken by the city to force the tax claims under this ordinance to a judgment.

Seattle Wants Authority Established

A complaint has been filed in the Superior Court of the State of Washington, by F. A. Twichell, against the city of Seattle and the Puget Sound Traction, Light & Power Company, in which it is alleged that under present conditions the purchase of the railway property by the city from the traction company would be illegal. The plaintiff asks that the city and company be restrained by the court from proceeding with negotiations now under way to complete the purchase, and that a court injunction be issued forthwith. It is further alleged that the city, in making a part of the purchase contract a provision permitting the company to furnish power for the operation of the railway, has gone outside its jurisdiction. These actions are in final proceedings to establish the authority of the city to conclude the municipal ownership negotiations which have been under way for some months past.

Louisville Wages Again a Problem

The Louisville (Ky.) Railway and Amalgamated Association have been unable to agree on demands made by the men for a further increase of 7 cents an hour, with the result that the union has taken the matter up with the War Labor Board.

On Dec. 12 an ultimatum was sent to the company. The latter announced that the question would be discussed, and an answer returned by Dec. 23. The directors met on Dec. 20, but no report was made of the proceedings.

President Minary in a letter to the union stated that when the former labor schedule was arranged it was to have held until Jan. 1, when the union could reopen the question.

Mr. Minary calls attention to the fact that the company has been hoping to secure an increase in fares, but has been unable to secure any advance. Another increase in wages of 7 cents, or to a maximum of 45 cents an hour, is impossible under a 5-cent fare, with the present operating expenses. It is said that the company, aside from the considerations just mentioned, feels that the demands of the men are unjustified, particularly in the light of the lessened demand for labor in the war industries.

Service-at-Cost Now

Buffalo Veers Around from Municipal Ownership Talk to Cleveland Service Plan—Valuation Arbitration

An agreement has been reached between the International Railway and the municipal authorities of Buffalo, N. Y., whereby both parties will arbitrate the question of the valuation of the company's properties within the city of Buffalo. The valuation figures will be used in reaching an agreement between the company and the city modeled after the so-called Cleveland service-at-cost plan.

VALUATION BOARD OF THREE

In an opinion issued by the city law department, it is held that one man should be selected by the company; one selected by the city and these two should agree upon a third man. There will be nothing to prevent any member of the board, on behalf of the party represented, from engaging experts to help in determining what is a just and reasonable valuation.

It is proposed that the company and the city shall be bound by the valuation made by the arbitration commissioners only to the extent that the award is to be used if an agreement is made. If the city decides the award is too high, it can reject the finding, and if the company believes the award is too low, it can reject the return. If an agreement is made, however, the award shall be the basis of it.

Attention is called by the city law department to the appraisal made for the city by John C. Brackenridge, New York, as of June 30, 1915, which fixes the physical value of the company's properties within the city at $18,013,808. The items entering this total, it is said, have been approved by H. E. Riexinger, the company's chief engineer, except that he claims the figures do not include contractor's profits. To this total Mr. Brackenridge has added for intangibles the sum of $2,620,925, making the total reproduction cost as of June 30, 1915, $20,634,733.

CONTROL PLAN EXPECTED TO PASS

It is generally believed that a resolution will be enacted by the City Council placing the International Railway under city control on a plan modeled after the so-called Cleveland service-at-cost plan, which has the approval of E. G. Connette, president of the railway. This resolution would also be subject to a referendum. It is proposed that the two resolutions be submitted to the electors at the same time at a special referendum.

Regulative Matters Discussed

New York Commission Points Out Limitations of Authority Under Existing Laws and Asks for Broader Powers

The Public Service Commission for the Second District of New York, in its annual report to the Legislature on Jan. 13 urged consideration by the Legislature of certain defects in the public service commissions law and recommended amendments to give the commission broader powers over questions of rates and service by public service corporation.

Adequate Rates a Matter of Necessity

In this connection the commission says:

> It was undoubtedly the intention of the Legislature to provide in the Public Service Commissions Law for tribunals having the character, the ability and the facilities to determine the complaints, not only of consumers and patrons of the various public service corporations as to inadequacy and insufficiency of service, or undue profiteering in the rendition of service, or discrimination between individuals and the like, but recognizing that the public service corporations have legal and business rights, to afford them also a tribunal which should impartially inquire and if necessary give relief by way of increased rates.
>
> It is true that to a certain extent the incomplete and defective jurisdiction of the commission has been supplied by the waiver by certain cities and villages of franchise conditions, and by voluntary submission to the arbitration of the commission. These, however, are but temporary and makeshift devices and, in the judgment of the commission, neither it, nor the municipalities, nor the public service corporations, ought to be left to any such expedients. To carry a passenger, to transport property, to furnish a householder with light or heat, or with the means of communication by telegraph or telephone, is to render a useful and legitimate, in fact an indispensable service. To be able to receive an adequate compensation therefor is not only a matter of justice and fair play, but a matter of necessity. Unduly to profiteer in the rendering of any such service is an evil which should be prevented, and the Legislature has adequately provided for such prevention. But the Legislature has not provided reciprocally for needs which must arise for increased compensation.

The commission says that still another subject for legislative consideration is presented by a recent decision of the Court of Appeals to the effect that the commissions are without authority to require a corporation subject to their control to set aside from its operating revenues a specified amount to be credited to an account called "Accrued Amortization of Capital," which includes depreciation reserve.

Adequate Reserves Essential

In this connection the commission says:

> It is scarcely open to argument that the commission cannot perform its duty of requiring public service corporations constantly to maintain facilities safe and adequate for the public service unless it may require, certainly before the payment of dividends and probably before the payment of interest, the setting up of an adequate reserve for replacements. Legislation which may confer upon the commission such power is urgently recommended.

The report states that abnormal economic conditions, precipitated by the war, affected the public utility corporations. At the same time, the acid test imposed has, according to the commission, brought into strong relief what is regarded as certain defects in the public service commissions law which should receive the immediate attention of the Legislature.

Reference is made to the action of the Federal War Labor Board in granting increases in wages to employees of public service corporations, advances in costs of fuel and structural materials and requests for approval of increased rates. The commission responded as well as lay within its power to the latter requests where the actual need was demonstrated by evidence after a hearing. Great confusion resulted, the commission reports, in a large number of cases from the fact that the Legislature had not conferred upon the commission the requisite power to give relief. It became plain that while adequate power over service had been conferred, together with plenary power to reduce rates, there was lacking a power to increase rates.

Rochester and Buffalo Cases

The report says nothing is clearer than that a public service corporation, in order to render an adequate and satisfactory service, must receive a compensation which will enable it so to do. The commission is vested with adequate power to require adequate service and to reduce rates if it finds after investigation that they are excessive. But in the case of street railroads, whose maximum fare is fixed by franchise agreement or condition, it was held by the Court of Appeals in the Quinby or Rochester case that the commission is without power to increase a rate so fixed, no matter how great the need therefor may be in justice and in fact.

A similar ruling has been made by the Court of Appeals in the matter of the International Railway versus Rann where the maximum fares in Buffalo are fixed at 5 cents by the terms of the so-called Millburn agreement. The commission has never made any investigation as to the insufficiency of the 5-cent fare in Rochester or in Buffalo, having been prevented from doing so by the issue of a writ of prohibition in the Rochester case and by the knowledge of the decision of the Court of Appeals in the Buffalo case. The commission continues:

> Perhaps an investigation would disclose that the existing fares are sufficient; on the contrary it might show that they are insufficient. In the case of the International Railway, which operates in Buffalo and vicinity, the company claims that it is on the verge of bankruptcy by reason of insufficient fare, and there has been much local agitation concerning this claim. By reason of the decision in the Quinby case, however, there is apparently no authority or tribunal possessed of power to fix and determine a just rate of fare.
>
> It is immaterial whether a public service corporation is prevented from charging an adequate rate by statute, by a franchise condition, or by an independent agreement between the corporation and the municipal authorities. The public service commission law ought to be sufficiently broad to cover all questions, both of rates and service.

The Public Service Commission for the First District of New York, the activities of which cover Greater New York, confines its report to the Legislature very largely to a review of its construction and regulatory activities during the previous year. Any suggestions that it has in regard to legislation are embodied in bills which are presented direct at Albany. In its present summary to the Legislature the commission says that in point of value of transit lines placed in operation, 1918 was the banner year since the dual subway contracts were entered into in 1913. The cost to construct these lines was $103,000,000, exclusive of the cost of the equipment used on them. All the work for the coming year, however, is dependent upon such action as may be taken by the Board of Estimate & Apportionment, the report points out.

Dayton Wants Consolidation and New Franchise

In a letter to J. Sprigg McMahon, representing the electric railway at Dayton, Ohio, the City Commission has made known its desire that the various companies operating in that city be consolidated within six months, in order that more economical operation may be secured. Failure to comply will be taken as sufficient reason for taking over the properties by the city, the letter stated.

It was also announced on Jan. 8 that the city will ask the companies to accept an ordinance, providing for a straight 5-cent fare. This ordinance was to have been presented at a meeting of the commissioners on that date, but it was withheld because of the absence of the Mayor and City Attorney

In connection with the desired consolidation, the city proposes that the roads give up their present franchises and accept one that will give the municipality greater regulatory power.

Service Control Rights a Problem

The Cleveland (Ohio) Railway ordinance must be extended by May 1, 1919, or the city will lose its right to control operation and the company will be free to put into operation the maximum rate of fare in order to accumulate a fund to insure its safety at the expiration of the franchise on May 1, 1934. The only right the city would have left during the intervening period would be police power to require adequate service.

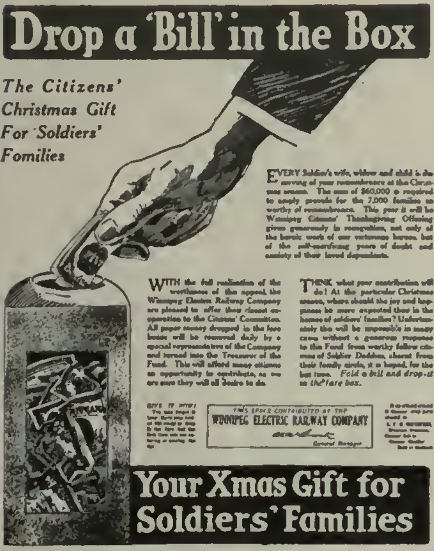
President Harry C. Gahn has suggested that in extending the franchise the grant be so amended that the rate of dividend to stockholders shall depend upon the rate of fare. If the rate of fare is low then the dividend shall be high and vice versa.

The city may, of course, exercise its right to purchase the property. The agreed price is the face value of the stock and bonds of the company plus 10 per cent. This would amount to approximately $37,400,000.

A Good-Will Message

General Manager McLimont of Winnipeg Boosts Christmas Offering for Soldiers' Families

A committee consisting of leading citizens of the city of Winnipeg, Man., on Dec. 9 started a campaign to obtain contributions to a fund to provide a "Citizen's Christmas Gift to Soldiers' Families" in Winnipeg. The committee wished to raise $60,000 by voluntary contribution, this sum to be divided among the soldiers' families in the city in accordance with the number of persons in each family, to provide Christmas presents for the children and Christmas cheer generally.


Drop a 'Bill' in the Box
The Citizens' Christmas Gift For Soldiers' Fomilies
THIS SPACE CONTRIBUTED BY THE
WINNIPEG ELECTRIC RAILWAY COMPANY
General Manager
Your Xmas Gift for Soldiers' Families

EVERY Soldier's wife, widow and child is deserving of your remembrance at this Christmas season. The sum of $60,000 is required to amply provide for the 7,000 families so worthy of remembrance. This year it will be Winnipeg Citizens' Thanksgiving Offering given generously in recognition, not only of the heroic work of our victorious heroes, but of the self-sacrificing years of doubt and anxiety of their loved dependents.

WITH the full realization of the worthiness of the appeal, the Winnipeg Electric Railway Company are pleased to offer their closest co-operation to the Citizens' Committee. All paper money dropped in the fare boxes will be removed daily by a special representative of the Company and turned into the Treasurer of the Fund. This will afford many citizens an opportunity to contribute, as we are sure they will all desire to do.

THINK what your contribution will do! At this particular Christmas season, where should the joy and happiness be more expected than in the homes of soldiers' families? Unfortunately this will be impossible in many cases without a generous response to the Fund from worthy fellow citizens of Soldier Daddies, absent from their family circle, it is hoped, for the last time. *Fold a bill and drop it in the fare box.*

WINNIPEG RAILWAY'S APPEAL

A. W. McLimont, general manager of the Winnipeg Electric Railway, took an active interest in the campaign from its inception. The company's donation to the fund took the form of an expenditure amounting to $1,000 in advertising for donations. Mr. McLimont originated the plan of asking the public to "drop a bill in the fare box" for the Christmas fund. One of the ads run in the daily newspaper is shown herewith.

PLACARDS PLACED IN CARS

Placards similar to the ad were also posted in the company's cars. One of these posters was signed jointly by the Mayor of Winnipeg and Mr. McLimont. The company issues a paper each fortnight, 40,000 copies of which are distributed free on the cars, and the leading article of Dec. 16 issue was devoted to the campaign.

All members of the general committee comprising 200 leading citizens received copies of this issue of the *Public Service News* sent by the secretary of the committee.

The street cars in Winnipeg are equipped with protruding fenders, and a large banner requesting citizens to "drop a bill in the fare box" was placed on each fender. A full sized billboard was also erected on each side of a car and this car was operated during the rush hours through the principal streets of the city.

It was not expected that any substantial amount would be realized from the fare box collections, owing to the fact that the principal source of revenue for the fund was big contributions from the businessmen of the city. The rank and file of the general public, however, responded very generously to the appeal to place their money in the fare box and more than $1,000 was realized from this source, in addition to an order for a load of wood, Victory Bond coupons, etc. The employees of the company contributed $400 to the fund.

The newspapers of the city and the thousands of soldiers' families commented very favorably on Mr. McLimont's action in getting behind the Christmas gift fund. Mr. McLimont feels that the employees of the company have greatly benefited from being privileged to participate in the campaign and that working with other citizens in this way has been in mutual interest.

B. R. T. Message to Ex-Soldiers

The Brooklyn (N. Y.) Rapid Transit Company has established two bureaus where information and guidance may be obtained by men now in the military service with respect to employment opportunities available to them in all its departments.

One of these bureaus, known as the Borough Hall branch, has been established at 185 Montague Street, in the heart of the business district of Brooklyn. The other is at 438 Fulton Street, Jamaica, two minutes' walk from the Long Island Railroad. The Jamaica bureau was opened on Dec. 16. This bureau especially is handy of access by men in the camps on Long Island and a large number of soldiers from Camp Upton and Camp Mills who had either just been discharged or were about to receive discharges have already applied there for information concerning opportunities in the company.

The Montague Street branch and the regular employment bureau at 40 State Street have also received calls from many sturdy and intelligent ex-soldiers and ex-sailors.

An attractive little leaflet entitled "A Greeting and an Opportunity for the Men of Our Victorious Armies Returning From Overseas, From the Brooklyn Rapid Transit System" has been widely distributed where it will be most apt to reach discharged soldiers and sailors.

This leaflet briefly tells of the opportunities of employment with the company and gives the necessary directions to reach the information bureaus from Camp Dix, Camp Merritt, from the New York City Hall, from Camp Mills, Camp Upton and from the Long Island station at Flatbush and Atlantic Avenues.

The leaflet is 4 in. wide by 6 in. high. It contains four pages very artistically displayed typographically.

New Commission Bill Introduced

The bill outlined by Governor Smith of New York in his message to provide for the reconstruction of the Public Service Commission in New York City was introduced in the Senate on Jan. 9 by James A. Foley, minority leader, and in the Assembly by Charles B. Donahue.

The measure follows closely the Governor's recommendation that the present commission be abolished. It provides for the repeal of the present section of the public service commission law fixing the number of commissioners for the First District at five, and substituting a new section which provides that there shall be one commissioner, whose term shall be five years, and a transit construction commissioner to be appointed by the Governor with the consent of the Senate, for a like period.

Under the terms of the bill the single commissioner is to be concerned only with the regulation of public service matters, while the transit commissioner is to confine his entire time to construction work. This commissioner is to receive $15,000 a year and have the appointment of not more than four deputies at $7,500 a year each, one of whom may exercise the powers of the commissioner. The transit construction commissioner must be a resident of New York City, is to receive $15,000 a year, and is to have all the powers of the old Rapid Transit Commission.

The new Governor of New York is a democrat. There is naturally much speculation as to what attitude the republican Legislature will assume toward the measure.

Short Milwaukee Strike

A strike of the employees of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., which went into effect at 6 a.m., on Jan. 1, was declared off the evening of the same day, pending an effort by a committee of business men to have the Wisconsin Railroad Commission settle the controversy over the matter of an increase in fares. The company has maintained that it could not increase the pay of its employees out of its present earnings.

The employees' association had the books of the company examined by their accountants, who reported that the company was unable to pay increased wages without an increase in fares. The employees' association presented these facts to the Railroad Commission and the Governor, both of whom promised action before Jan. 1. The commission and the Governor declined to intervene and the strike went into effect as scheduled by the employees' association. The commission promised the Association of Commerce that it would make a prompt investigation of the allegations of the company and the employees and make the finding of the facts at the earliest practicable date. The findings in the report made for the employees' association were referred to in this paper for Jan. 11, page 117.

Meeting an Emergency

Publicity Plays Prominent Part in Putting Patrons in Possession of Plans Made for Their Benefit

The interurban cars of the Indianapolis & Cincinnati Traction Company were recently cut off from reaching the terminal station and business section of Indianapolis because of the collapse of the Virginia Avenue viaduct. Arrangements were quickly made for meeting the emergency thus presented, and the public was informed of the changes made in an advertisement, set across three columns, published in all the papers in the territory served by the railway. This ad the company reprinted in dodger form and hung copies of it in the cars on strings so they would be readily available to the public. The ad tells its own story. It is reproduced herewith.

QUICK WORK

INDIANAPOLIS & CINCINNATI TRACTION COMPANY

On January 6 the Virginia Avenue Viaduct in Indianapolis, a very old structure, gave way completely, cutting off our interurban cars from the Terminal Station and the main business part of the city. A temporary arrangement for handling passengers on both sides of the viaduct, carrying them on city cars to and from • Keystone Avenue, was at once inaugurated. The freight was handled by us on auto trucks between the city freight house and our junction on Southeastern Avenue, at which point our freight cars were loaded and unloaded.

Much quicker than seemed at all possible the Indianapolis Traction & Terminal Company constructed a temporary loop at Louisiana Street, near the viaduct, and had it ready for use the morning of Jan. 9, and our passenger cars then began operating up to and around that loop.

In conjunction with the Interstate Public Service Company we secured from the Indianapolis Board of Public Works authority for the Traction & Terminal Company to construct a temporary track from Virginia Avenue over Louisiana Street to Alabama Street, thence on Alabama Street to South Street, thence on South Street to Delaware Street, there connecting with tracks already laid on South Street, over which to operate our cars to Kentucky Avenue and thence by Kentucky Avenue and Capitol Avenue to the Terminal Station. The city company, with wonderful management and energy, notwithstanding it was mid-winter, pushed this work with such speed that on Monday morning, Jan. 13, we commenced operating our cars, both freight and passenger, over it and into the Terminal Station.

We are pleased to call the attention of the public to this highly commendable handling of a very difficult situation. It was all done in a week's time.

Patrons of our road can now travel from any point on our lines to the Terminal Station in Indianapolis and can ship freight and express without transfer or delay of any kind.

We are proud of our people, and those of the other companies co-operating, for what they have done and what they have accomplished.

Until the steam road track elevations are completed over Virginia Avenue, our cars, both passenger and freight, are to operate into Indianapolis from Virginia Avenue over the South Street and Kentucky Avenue route, occupying only a few minutes longer than by the old route. When the track elevation is completed we will again run in by the old route on Virginia Avenue to Delaware Street.

We want to thank our patrons for their kind co-operation and good natured patience during these few days of troublesome and inconvenient operation.

RAILWAYS EXPLANATION TO ITS PATRONS

News Notes

Detroit Hearing Again Postponed.—The session of the War Labor Board in Washington to take testimony in the case of the women conductors on the lines of the Detroit (Mich.) United Railway, set for Jan. 14, has again been postponed. The new date is fixed at Jan. 18 at Washington.

Commission Refuses to Approve Lease.—The Public Service Commission of Pennsylvania on Jan. 15 announced that it had decided not to sanction the agreement entered into by the Philadelphia Rapid Transit Company for the joint operation of the municipal lines in Philadelphia and those now operated by the company.

Tacoma Again Operates Its Municipal Lines.—On Jan. 1 the city of Tacoma, Wash., through the Department of Public Works, took over the operation of the municipal tideflats car line, which has been operated by the Tacoma Railway, Light & Power Company under contract. There is now a deficit of $20,000 accumulated against the line, which Commissioner H. Roy Harrison believes can be turned into a surplus. The saving, it is said, will come in the operation of the line with a reduction in overhead expense; by more thorough methods of fare collection and by economy in management in other directions.

Votes to Revoke Railway Grants.—The City Commission of Jersey City, N. J., has adopted an ordinance revoking fifteen franchises granted by the muncipality to subsidiaries of the Public Service Railway on the ground that they were granted originally upon condition that not more than 5 cents should be charged for a continuous ride. The 7-cent fare case is now pending in the Court of Errors and Appeals. It is expected that an appeal will be taken by the railways in certiorari proceedings. In the meantime cars will run as usual and 7-cent fares will continue to be collected of the subway.

Bursting Water Main Ties Up Subway.—The Broadway subway in New York city operated by the New York Municipal Railway (B. R. T.) was flooded from 5 a. m. on Jan. 12 to 2.30 p. m. on Jan. 13. A torrent of water estimated at 3,000,000 gal. rushed into the subway at Fourteenth Street from a bursted 36-in. Catskill Aqueduct main. When completed this main will pass over the subway at that point, but due to the unfinished work the subway was open for the water to rush in. The water first entered a 60 ft. cut in the unfinished "Fourteenth Street" crosstown line which passes under the Broadway subway at that point. This was completely flooded and in the Broadway subway the water extended as far north as Twenty-eighth Street. At some places the water was 4 ft. over the tracks. Powerful machine pumps, fire department engines and a newly constructed pump car of the Brooklyn Rapid Transit Company were rushed into use. It took three hours to locate the break and shut off the water

Programs of Meetings

A. S. M. E.

The American Society of Mechanical Engineers has selected tentatively the dates June 17 to 20 for the spring meeting which will be held at Detroit, Mich.

M. C. B. and M. M. Convention

The Master Car Builders' Association and the American Railway Master Mechanics' Association will hold their convention this year in Atlantic City, N. J., June 18-25. This will be the first convention of these associations since 1916, meetings having been abandoned during the war. This year the associations expect to have a convention of the old-fashioned kind with a full exhibit. An invitation will be extended to all foreign trade bodies now represented in this country, and through the embassies at Washington all foreign nations (exclusive of the Central Powers) will be invited to send representatives. The railroad administration at Washington has approved the meeting.

American Wood Preservers' Association

The fifteenth annual meeting of the American Wood Preservers' Association will be held in St. Louis, Mo., on Jan. 28 and 29, with headquarters at Hotel Statler. Among other topics treated will be the zinc chloride and creosote oil situations, and a paper will be presented: "The Transition from Creosote Oil to Zinc Chloride in the Treatment of Cross Ties." Another paper will be one on "Developments of Uniform Practices in Procuring and Preserving Cross Ties," by John Foley of the Forest Products Section of the United States Railroad Administration. A number of committee reports will be presented, including those on preservatives, purchase and preservation of treatable timber and non-pressure treatments.

Financial and Corporate

Chicago Elevated Noses Out

Revenue Gains Beat Rise in Operating Expenses and Taxes by a Small Margin

Despite higher operating costs, due to wartime conditions and other causes, the elevated lines in Chicago were able in the fiscal year ended June 30, 1918, to increase their net income by the slight amount of $9,798, or about 0.7 per cent. Such is the showing indicated in the latest annual report of the Chicago Elevated Railways Collateral Trust, which controls the South Side Elevated Railroad, the Northwestern Elevated Railroad and the Metropolitan West Side Elevated Railway.

The gain in net was due to the increase in gross operating revenues by $487,251 or 5.2 per cent, this gain not being completely offset by the rise in operating expenses and taxes. Operating expenses jumped up $403,491 or 8.3 per cent, and taxes, etc., $69,074 or 8 per cent.

COMPARATIVE INCOME STATEMENT OF CHICAGO ELEVATED RAILWAYS FOR YEARS ENDED JUNE 30, 1917 AND 1918

	1918		1917	
	Amount	Per Cent	Amount	Per Cent
Gross operating revenue	$9,777,164	100.0	$9,289,913	100.0
Operating expenaes:				
Way and structures	$284,458	2.9	$212,692	2.3
Equipment..........	593,113	6.1	523,156	5.6
Power..............	1,133,841	11.6	1,155,093	12.4
Conducting transportation............	2,806,136	28.7	2,407,088	25.9
Traffic.............	21,185	0.2	27,677	0.3
General and miscellaneoua............	389,244	3.9	498,777	5.4
Total operating expense...........	$5,227,977	53.5	$4,824,486	51.9
Net operating revenue..	$4,549,187	46.5	$4,465,427	48.1
Taxes, city compensation and other items.............	932,408	9.5	863,334	9.3
Operating income......	$3,616,779	37.0	$3,602,093	38.8
Non-operating income	*150,490	1.5	* 151,589	1.6
Gross income..........	$3,767,269	38.5	$3,753,682	40.4
Deductions—interest and rents..........	*2,390,451	24.4	*2,386,662	25.7
Net income............	$1,376,819	14.1	$1,367,020	14.7
Dividends...........	1,198,394	12.3	1,176,345	12.6
Surplus..............	$178,423	1.8	$190,675	2.1

*Inter-company rentals deducted.

It should be noted, however, that the foregoing figures are applicable to the period when wages were considerably lower than at present, for the increases granted by the War Labor Board dated from Aug. 1, 1918. Moreover, the gain in net income during 1918 was less than that during the preceding fiscal year, for in the year ended June 30, 1917, the net income was $100,902 or 7.9 per cent higher than in the year before.

The annual report of the Chicago Elevated Railways Collateral Trust, which is for the calendar year 1917, shows gross income of $1,387,682, compared with $1,372,475 in 1916. Total disbursements, chiefly for interest, amounted to $1,362,178, leaving a surplus for dividends of only $25,503, compared with $123,801 the preceding year. All the year's surplus and slightly more was absorbed by a charge of $26,100 for expenses incidental to extension of the $7,000,000 of secured gold notes, dated July 1, 1914, and miscellaneous debits.

Receiver for Spokane & Inland Empire

On petition of the First Trust & Savings Bank, Chicago, Ill., Federal Judge Cushman at Tacoma has named F. E. Connors, Chicago, receiver for the Spokane & Inland Empire Railroad, Spokane, Wash. Losses of the company for the last six months have averaged $10,000 monthly. Waldo G. Paine, vice-president of the company, said:

"Decreasing revenue made it impossible to pay interest on our bonds any longer. The influenza ban hit us hard. Where ordinarily the income reaches $1,400 daily it has gone down to $700 to $800 daily. The bondholders have demanded their money and say it is their intention to get it if they have to junk the system."

A writ of subpena in chancery was served on Mr. Paine. The company has twenty days in which to appear and answer allegations in an original bill of foreclosure. The issue on which the court action is based is the $15,000,000 authorized first and refunding mortgage 5 per cent bonds of the Spokane & Inland Empire Railroad, of which $2,699,500 are outstanding. This issue was dated May 1, 1906, is due May 1, 1926, and the trustee is the First Trust & Savings Bank, Chicago, Ill. Preceding this issue there are outstanding $422,000 of first mortgage 5 per cent bonds of the Coeur d'Alene & Spokane Railway, $96,000 of first mortgage 5 per cent bonds of the Spokane Traction Company and $201,500 of first mortgage 5 per cent bonds of the Spokane Traction Company.

The railway system includes city and suburban lines of more than 290 miles.

Mr. Connors as receiver has issued a circular announcing that the former executive officers of the company will be retained in their present positions while he is in charge.

Higher Fares Help Lexington

Company Reports Steady Improvement in Traffic with No Complaint at Increased Rates

The gross earnings of the railway department of the Kentucky Securities Corporation, Lexington, Ky., during the fiscal year ended June 30, 1918, showed an increase of $22,236 or 4.1 per cent. This gain reflected in part the generally satisfactory business conditions in the company's territory but in the main the higher average rates of fares. Because of the advance in operating costs, however, the net earnings of the railway department fell off $15,789.

The number of passengers carried, including transfers, was as follows:

	Year Ended June 30		
	1918	1917	1916
Lexington city lines..	3,959,734	4,507,286	4,389,905
Interurban lines	1,660,133	1,599,197	1,482,881
Other cities.	426,624	438,324	497,054

In comparing the number of passengers carried, as shown above, the decrease on the Lexington and city lines and the small increase on the interurban lines were mainly due to the restricted movement of cars during December and January, when there was unprecedented weather throughout the entire country. It is said that conditions for some time have been normal and indicate a steady improvement in the number of passengers carried with practically no complaint at the higher fares.

INCOME STATEMENT OF KENTUCKY TRACTION & TERMINAL COMPANY AND AFFILIATED COMPANIES FOR YEAR ENDED JUNE 30

	1918	1917
Operating revenue	$1,021,448	$912,540
Operating expenses..	605,274	480,265
Net operating revenue.	$416,174	$432,275
Miscellaneous income	45,180	39,289
Gross income	$461,354	$471,564
Taxes, rentals, etc..	73,449	46,462
Net income	$387,905	$425,102
Interest on bonds.....	229,006	218,034
Surplus for dividends...	$158,899	$207,068

The fixed charges of the companies in the system have increased $43,546 during the last year. This is accounted for by a 30 per cent increase in taxes, a 5 per cent increase in interest, and twelve-months' rental of leased property in comparison with only two-months' rental in the preceding year. A comparative income statement of the Kentucky Securities Corporation, exclusive of inter-company charges, is shown in the accompanying table.

During the year just ended the operating companies spent $240,270 on new construction. Additions to the railway department required $16,694 of this amount, and paving for the railway department $21,188. Of the total expenditures 97 per cent was spent up to Jan. 1, 1918, and the remainder during the last six months of the fiscal year.

B. R. T. Receiver Confirmed

Federal Judge Denies Present Advisablity or Necessity for Co-Receiver for City or Commission

Judge J. M. Mayer in the United States District Court on Jan. 15 denied the applications of the Board of Estimate and Apportionment of New York City and of the Public Service Commission for the First District of New York for additional receivers to administer the affairs of the Brooklyn Rapid Transit Company. He made permanent, however, the appointment of Lindley M. Garrison as sole receiver. Mr. Garrison's temporary appointment was made on the last day of 1918.

CO-RECEIVER NOW MIGHT DESTROY EFFICIENCY

Counsel for the city and the commission urged that the city's investment in the rapid transit system warranted the appointment of a co-receiver, but there were evidences of dissension between them as to which body should be allowed to represent the public and who should be appointed as receiver. Judge Mayer stated that a time might come in working out the financial future of the company when the aid of a receiver representing at that time the "united view of the public authorities" might be of great service, but he thought that any co-receivers at present would destroy the efficiency of the receivership.

In this connection Judge Mayer indicated pointedly that a receiver is simply a representative of the court; that private owners in the case of a receivership cannot settle affairs outside without submitting their settlement to the judgment of the court, and that the duty of the court is to conserve and operate the property under existing contracts without favoring any faction or interest. He added that the court is entitled to a singularity of purpose in a receivership, and that a co-receivership now in the B. R. T. case "might transfer from a forum outside the receivership and the court the controversies which might properly be settled at some place and time other than by court."

Judge Mayer added that Mr. Garrison, besides being personally acceptable to all parties in the present case, is peculiarly fitted by training and experience to act as receiver. From 1904 to 1913 he was vice-chancellor of New Jersey, being in that capacity connected with a court of equity second to none in the country.

RECEIVER REVIEWS COMPANY'S AFFAIRS

Mr. Garrison presented to Judge Mayer a preliminary report on his receivership covering a survey of the finances, general resources and obligations of the company, its rapid transit lines in operation and their equipment; and lines under construction by the city. The report also discussed the organization of the various departments of the company, the functions of each, the salaries paid to officials and department heads, and the cost of conducting each department. The receiver summarized the terms of the contract between the New York Municipal Railway Corporation and the city of New York, and discussed the present status of the contract obligations on both sides, and those items of the contract already fulfilled.

Obligations yet to be fulfilled were given as follows:

There are yet to be furnished and supplied by the New York Municipal Railway Corporation the following things, which it is estimated will cost approximately $10,000,000 exclusive of taxes, discount and interest during construction, the amount of which is chargeable to cost under the subway contracts, but cannot be determined definitely in advance. Neither do the figures include possible purchases of real estate or abutting property owners' damages on account of elevated railroad obstruction.

Completion of equipment of city railroads for "initial operation" (includes 100 additional cars not yet delivered).......	$5,500,000
Completion of additional tracks on extensions of existing railroads	2,500,000
Reconstruction of existing railroads (includes yard at Coney Island and Thirty-sixth Street inspection shed if not furnished by city).............	2,000,000
	$10,000,000

In respect to the above, obligations outstanding on account of work now under way or contracted for will call for approximately $5,000,000, which will be payable at monthly intervals within the next ten months in amounts of approximately $500,000 a month.

Included in the above total of $10,000,000 are items aggregating approximately $3,000,000, the expenditure of which will probably not be required until after July 1, 1920.

The report recommended that provision be made as soon as possible for 400 or 500 new steel motor cars, to cost approximately $20,000 each.

CHIEF DIFFICULTY IS LACK OF CASH

Work that remains to be done by the city, including the extension and construction of rapid transit lines, includes 47 miles of track out of a total of 115, and 19 miles of road out of a total of 41, of the lines which the city assumed to construct and which the company agreed to equip and operate.

The chief difficulty of the Brooklyn Rapid Transit Company at present was described as "lack of cash." Dividends on stocks of companies owned have been reduced or entirely suspended, the constituent companies are in arrears in payment of interest on their certificates of indebtedness, and the New York Municipal Railway Corporation has failed to pay the interest due Jan. 1 last on its bonds, most of which are owned by the Brooklyn Rapid Transit Company.

Under the heading "Increased Costs of Labor, Material and Supplies" it was stated that the receivership companies have suffered greatly from these causes. Taking the month of November, 1918, as a basis for the entire year, the increase for the fiscal year ending June 30, 1919, as compared with the fiscal year ending June 30, 1916, would be:

	1919	1916	Increase
For labor	$15,498,229	$11,324,998	$4,173,232
For fuel	3,190,874	1,422,606	1,768,068

Marked increase in the cost of material was also noted.

The effects of higher costs generally throughout the system were graphically set forth in a statement for the five months ended Nov. 30, 1918, compared with the same months of 1917, which shows that in these months the system earned only $318,729 over all charges, whereas in the corresponding period of 1917 it earned $2,395,750—a falling off of $2,077,021 or 86 per cent.

The financial requirements for the immediate future for the three receivership companies were given as follows:

NEW YORK MUNICIPAL RAILWAY CORPORATION	
For construction and equipment work now under way pursuant to city contracts, and payable at intervals during the next ten months	$5,000,000
Interest chargeable to construction to Jan. 1, 1919, and unpaid	809,500
Sinking fund due Jan. 1, 1919..	190,500
BROOKLYN RAPID TRANSIT COMPANY	
Bills payable to banks and trust companies	3,350,000
Additions to power facilities (mostly under contract and payable within the next six months)	1,453,000
(Most of this work is being done by the B. R. T. as agent for the Broklyn Heights Railroad, and the cost will eventually be repaid by the latter company, but the facilities are needed to enable the B. R. T. to carry out its contract for furnishing power.)	
Purchase of fifty trailer cars with appurtenances (as agent for surface railroad companies)...	417,000
NEW YORK CONSOLIDATED RAILROAD COMPANY	
Interest due Feb. 1, 1919, on underlying bonds	540,000
Conversion of surface cars for trailer operation (as agent for surface railroad companies)..	200,000
Replacement of storage and dock facilities required by government's requisition of existing facilities, about.............	50,000
(Partly chargeable to constituent companies)	
Interest on 7 per cent notes due Jan. 1, 1919 and unpaid......	2,020,725
Principal on 5 per cent notes due July 1, 1918	505,000

Financial requirements for the more remote future of the New York Municipal and the B. R. T., totalling $6,208,000 were also given.

In regard to the claims arising from the accident on the Brighton Beach line, Mr. Garrison said that provision will have to be made for raising money to meet these claims if they are to be paid. Damages still accruing on account of this disaster will probably total $1,100,000.

Mr. Garrison went into the matter of the welfare activities of the company. The amount for this work charged to the companies of which he is receiver was $52,604 last year. He recommended the continuation of the work.

Receiver for New Orleans Company

Abnormal Operating Cost and Persistent Public Attacks Destroyed Credit of Railway, Says President Curran

The United States District Court at New Orleans, La., has appointed J. B. O'Keefe receiver of the affairs of the New Orleans Railway & Light Company. The action was taken at the instance of the board of directors through a creditor company.

PRESIDENT CURRAN EXPLAINS

In explaining this action on the part of the directors D. D. Curran, president of the company, issued the following statement:

> This action was taken by the board of directors because of the fact that it has been found impossible to meet operating costs, taxes and fixed charges with the present inadequate revenues. During the year 1918 this company fell short of earning operating expenses, taxes, and fixed charges by approximately $1,000,000, by reason whereof the company was unable to meet the interest due on Jan. 1, 1919, on its bonds, and therefore had to avail itself of the days of grace provided by its mortgages.
>
> The company's present condition has been brought about by abnormal increases in operating costs, resulting in part from the excessive wage scale imposed upon it by the National War Labor Board and in part from the increased cost of supplies and materials used in and necessary for its operation. Furthermore, by reason of the persistent public attacks upon the company, its credit has been destroyed to such an extent that the continued operation of the properties was threatened and the interest of the public, as well as of the security holders of the company, could best be safeguarded by placing the property in the hands of the court, to be readministered and conserved in the interest of all parties.

The troubles of the company began to multiply early in 1918. Having certain maturities coming due on June 1 it applied to the War Finance Corporation for a loan. In its appeal the company was backed up by the Mayor and other city officials, who said that such an advance as the company had requested was necessary to prevent interruption of railway service. The War Finance Corporation refused, however, to make the loan unless the city agreed to put a fare increase into effect at once. To this the city assented and in the belief that the city would carry out its promise the corporation advanced $1,000,000 to the railway.

After two months had elapsed the War Finance Corporation called upon the city to act in the matter. Labor started to protest against the fare advance. Thereupon the National War Labor Board, which had passed upon wages in New Orleans, announced that where organized labor opposed advanced fares recommended by the board in connection with increased wage awards to employees of public utility companies, the entire award would be suspended.

FARES FINALLY ADVANCED

Meanwhile the Commission Council of the city passed the ordinance advancing fares. Labor then carried its case to Judge Cage in the Civil District Court of Louisiana in New Orleans and sought an injunction. He ordered the officers of the company to appear in court on Oct. 16 and show cause why the plea of labor to restrain the advance should not be granted. After several postponements the case finally came up for trial on Nov. 14. On Nov. 24 Judge Cage declared the 6-cent fare ordinance enacted by the Commission Council and put into effect by the company was legal and refused the injunction to prevent collection of the increased fare. The decision of the court in this case was reviewed in the ELECTRIC RAILWAY JOURNAL for Dec. 7, page 1027.

This did not still the opposition to the company, however, and late in December the Board of Public Utilities, acting upon the advice of Attorney General Coco, laid the foundation for a test suit to determine the power and authority of the board to regulate the public service corporations of the city by adopting a resolution abrogating and annuling the increase in fare and the advance in rates for gas and electricity and ordering the restoration of the old rates.

CITY MAKES SURVEY

Shortly after the appeal of the company to the War Finance Corporation for financial assistance Mayor Behrman directed E. E. Lafaye, commissioner of public property, to proceed at once to make a full survey of the property and affairs of the company and to employ such assistance as he might deem necessary. Mr. Lafaye's report was made public on Jan. 1. His recommendations have been summarized as follows:

> That the New Orleans Railway & Light Company be completely reorganized and recapitalized.
>
> That the Cleveland plan be adopted of adjusting rates charged by the company on a sliding scale, according to the company's earnings.
>
> That the Commission Council be given authority to fix these rates.
>
> That Mayor Behrman, Commissioner Glenny and Mr. Lafaye withdraw from the directorate of the New Orleans Railway & Light Company.
>
> That $38,000,000 be accepted as the present valuation of the company and that this figure be the one on which future earnings of the company shall be based.
>
> That on this valuation the company be permitted to earn 5 per cent in 1919, 6 per cent in 1920, and 7 per cent in 1921, the latter figure thereafter being the maximum earning power of the company.
>
> That the highest total recapitalization allowed when the company is reorganized should not exceed $45,710,400, thus eliminating entirely the existing preferred and common stocks of the company, which amount to $29,816,600.

Neither Mr. Lafaye's recommendations nor the report of E. W. Ballard & Company, retained by Mr. Lafaye as appraisal engineers and advisers to assist Mr. Lafaye in formulating his conclusions hold out any hope for relief from 6-cent carfares and the recent 30 per cent increase in electricity and gas rates.

Under Mr. Lafaye's plan of supervision of the New Orleans Railway & Light Company, the Commission Council would fix the service rates to be charged by the company. The rates would be on a sliding scale, to be lowered automatically when the earnings of the company reached a certain mark, or to be raised automatically when the company's earnings fell off.

For this purpose the Commission Council would receive weekly reports on the conditions and earnings of the company from the city government's own auditors. This adjustment of rates, so far as gas and electricity are concerned, would be made monthly. Changes in fares would be made from time to time as justified.

EXPERTS DISAGREE

Mr. Lafaye's report to the Council showed there was considerable difference of opinion between the company, Mr. Ballard, and himself as to the value of the company's properties.

Mr. Ballard fixed the actual cost value of all physical properties of the company at $36,294,413. The company accepted this figure as a base and from it built up a valuation of $52,188,205. Mr. Ballard, on the other hand, due to depreciation, maintained that the value of the property was $32,739,193.

Mr. Lafaye believed Mr. Ballard's figure to be too low and called in General George W. Goethals as referee. General Goethals valued the property at $44,816,000. Thus Mr. Lafaye's valuation of $38,000,000 is higher than Mr. Ballard's and lower than that of the company or General Goethals.

COMPANY'S FIGURE $50,000,000

George H. Davis of Ford, Bacon & Davis, in a communication to the New Orleans Railway & Light Company, dated Aug. 16, 1918, stated that in his judgment the physical value of the properties of the company was in the year 1914 about $40,000,000 and that the physical value represented only about 75 per cent of the total actual value. Thus the full value, according to Mr. Davis, would be $50,000,000.

In commenting on this figure Mr. Lafaye said:

> While it is true that the interests of the firm of Ford, Bacon & Davis have been identified with these and other similar properties in this country, both the firm, as a firm, and Mr. Davis, personally, are among the eminent engineers of this country, and such statements are not made without some basis in fact.

Trustees for Bay State

The Bay State Street Railway, Boston, Mass., has accepted the service-at-cost act, passed by the Legislature of 1918, and on Jan. 15 filed with the Secretary of the Commonwealth, as required by that act, a notice of its reorganization under the name of the Eastern Massachusetts Street Railway.

Immediately after being informed of the action of the company, Governor Coolidge sent to the Council the names of the following men to serve as trustees for a period of five years:

Homer Loring, Boston; Isaac Sprague, Wellesley; Frederick J. Crowley, Lowell; Earl P. Charlton, Fall River and Arthur G. Wadleigh, Lynn.

The trustees will take office on Feb. 1.

Changes in Columbus

New Officers and Directors Elected for Columbus Railway, Power & Light Company Following Recent Contest for Control

The contest between the stockholders' protective committee and the Clark interests in the Columbus Railway, Power & Light Company, Columbus, Ohio, came to an end on Jan. 10, when five of the representatives and supporters of the E. W. Clark Management Company resigned as directors.

SIX NEW DIRECTORS

The new directors are R. H. Platt, A. S. Hammond, Walter B. Beebe, Emil Kiesewetter, Samuel Ungerleider and F. R. Huntington. Mr. Huntington was chosen to succeed Adolph Theobold, whose death occurred recently. The retiring directors are Clarence M. Clark, R. S. Warner, Samuel G. McMeen, E. R. Pomerene and Carl J. Hoster. Those who held over are Charles L. Kurtz, D. Meade Massie, Norman McD. Crawford, W. C. Willard, W. A. Gill and E. K. Stewart. There was no desire to prevent Mr. Crawford and Mr. Stewart from being represented.

On motion of C. M. Clark at the directors' meeting on that date the contract with the Clark Management Company was abrogated, so far as it pertains to management and the fiscal agency, although its connection as engineer and builder of the Walnut Creek power house, is still in force.

On the previous day the company resumed its franchise and the old rate of fare of eight tickets for a quarter. It had been rumored that the company would go back to this rate of fare, but nothing was actually known about it until this action was taken.

REORGANIZATION ON JAN. 9

The reorganization was brought about on the evening of Jan. 9, after a long conference between the members of the stockholders' protective committee and the representatives of the Clark interests. This committee made the fight apparently to protect the company and put it in a position where it can have the needed relief, which did not seem to be forthcoming, because of the character of the contest that had arisen between the management and the City Council. To a large extent this condition may rest upon the shoulders of the City Council, but it existed, and the reorganization seemed to be the only way out.

Charles L. Kurtz was chosen president to succeed Samuel G. McMeen. Samuel Ungerleider was chosen vice-president, and Harold W. Clapp was retained as general manager.

The hearing in the receivership case, which was begun during the previous week before Common Pleas Judge Kinkead, is regarded to have hastened the reorganization. During the proceedings on Jan. 9 Judge Kinkead said:

"The railway, having broken its contract, was a trespasser in the city streets and subject to an action by the city to forfeit its franchise and the use of the streets. The only way in which the company can extricate itself is for it to go back and voluntarily perform its contract."

In reality this is what has been done and at the same time the management has been localized. It is the hope of the present officials that this change will meet with the approval of the city officials and the City Council and that some step will now be taken to provide a rate of fare sufficient to take care of the increased expenses, due to the exigencies of war, until some permanent settlement plan is reached.

The old management endeavored to secure a new contract with the city that would provide for operation at cost. The City Council gave no heed to this plea, and twice refused a request for a temporary increase that would take care of growing expenses until some definite plan could be made. When it appeared that an increase must be had or let the company go into the hands of a receiver, the management in August, 1918, renounced its franchise and advanced fares from eight tickets for a quarter to straight 5 cents.

Many people refused to pay the fare increase and were allowed to ride for nothing. Slips were issued to those who paid the increased rate, entitling them to a rebate in case the rate was declared illegal. Then two suits were brought in the United States District Court, with the idea of testing the legality of the move that had been made. In the first one the court declared itself without jurisdiction. The other one went a little further, but both were in reality against the company. The first case was argued before the United States Supreme Court on Jan. 10.

As produced in the receivership case before Judge Kinkead, the contract with the Clark Management Company to act as fiscal agent was in the form of a letter to the railway company, dated Jan. 31, 1914, stating that the management company had acted in that capacity since May 1, 1912, for which it had received 1½ per cent of the gross revenues, and offering to continue the service on that basis. This was later ratified by the board of directors. The salaries of President McMeen and Vice-President Clark were paid by the Clark Management Company. The contract with the Clark Company for general engineering in connection with the Big Walnut Creek power plant was at cost plus 7 per cent. Judge Kinkead ruled that the two contracts should be considered together and that if it appeared that the Clark company was dominating the railway as against the company's own interests it would be illegal.

Financial News Notes

Dividend Deferred.—The payment of the dividend on the preferred stock of the Virginia Railway & Power Company, Richmond Va., due on Jan. 20 has been deferred to a later date.

Receiver for Montgomery Company.—Ray Rushton, president of the Montgomery Light & Traction Company, Montgomery, Ala., was appointed receiver of that company on Jan. 10 by Judge Henry D. Clayton of the United States District Court. The application for the appointment was made by the Commercial Bank & Savings Company, New Orleans, La.

Yonkers Abandonment Hearing Continued.—The hearing before the Public Service Commission for the Second District of New York on Jan. 9 upon the petition of the Yonkers Railroad for the abandonment of certain lines was adjourned until Jan. 30 when the city and any individuals who desire to be heard may appear in opposition. The hearing on Jan. 9 lasted from 9.30 a. m. until 3.15 p. m. Practically the entire time was taken up in the submission of the railroad's case.

Angola Line Faces End.—The Indiana Utilities Company on Jan. 7, 1919, received permission from the Indiana Public Service Commission to sell or dismantle the Lake James Railroad, the subsidiary 3.75-mile line between Angola and Lake James. This line is a summer road to the lake resort. The commission's engineers valued the road at $92,000, reproduction costs. The remaining property of the company, which is devoted to light and power service, is not affected. The headquarters of the company are at Angola.

Added Expenses Offset Fare Increase.—The Trenton & Mercer County Traction Corporation Trenton, N. J., has filed with the Board of Public Utility Commissioners its monthly statement for November as suggested in an order when the board allowed an increase of from 5 cents to 6 cents for fares. The report shows that the company carried 257,799 fewer passengers during November this year than were carried in November of last year. Despite this, however, the revenue from passengers in November of this year was $13,954 more than in November of last year, but this gain was practically offset by an increase of $12,404 in operating expenses for the comparative periods.

Company Upheld in Receivership Case.—Federal Judge Martin J. Wade has sustained the motion of the Des Moines (Iowa) City Railway to strike out certain allegations of the petition of intervention filed by the city of Des Moines against the company in the receivership case. The motion declares that the action brought by the city is a prearranged plan to oust the jurisdiction of the State. According to Judge W. H. McHenry, counsel for the company, the ruling of Judge Wade establishes the legality of the receivership beyond a doubt. Judge McHenry announces that the next move by the company will be to file an application for an order of court to determine the rights of the company under the franchise.

Dismantlement Blocked by Injunction.—On Dec. 20 a temporary injunction continuing into 1919 was granted to restrain the dismantlement of the Southwestern Traction Company, Temple, Tex. This property, as previously noted in this journal, was sold at foreclosure sale late in 1917 to a committee of bondholders. The majority of the purchasers were desirous of dismantling the property and negotiated for the sale of the material. The operation of the line, however, has never ceased, and now the writ of injunction has been served. The plaintiff in the writ consists of many citizens of Temple and Belton, the terminal cities of the line, and citizens residing along the line. The writ was also joined in by the cities of Temple and Belton and the Commissioners court of Bell County.

Authorized to Defray Reorganization Expenses.—The California Railroad Commission has authorized the Sacramento Northern Railroad, successor to the Northern Electric Railway, Chico, Cal., to use $653,750 realized from the class "A" bonds to pay reorganization and foreclosure expenses and to satisfy a mortgage indebtedness of the Northern Realty Company. The bulk of the money, or $440,000 will be used for reorganization and foreclosure expenses, $137,500 to effect a settlement with the Sloss Securities Company and $76,250 to pay the mortgage indebtedness for the Northern Realty Company. The Sloss company has agreed to assume payment of the incumbrances on the property and cause the Union Trust Company, San Francisco, to dismiss its foreclosure action.

Dallas Gross Earnings Improve.—The elimination of the jitneys in Dallas, Tex., has resulted in greatly increased gross earnings for the Dallas Railway, according to the report for November. The gross earnings in this month amounted to $161,047, an increase of $50,716 or 45.97 per cent over the corresponding month of the preceding year, and an increase of $15,373 or 10.55 per cent over October, 1918. The November operating expenses plus appropriations to the reserve accounts totaled $133,623, an increase of $43,715 or 48.58 per cent over November, 1917, and an increase of $10,053 or 6.99 per cent over October, 1918. The amount available for the payment of the 6 per cent authorized return in November, 1918, was at the rate of 4.73 per cent per annum on the property value. Jitney competition was eliminated in July, but the increase in gross earnings resulting therefrom has been largely offset by higher wages and the like.

Sells Notes Direct to Public.—The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., is offering direct through advertisements in its home papers $3,600,000 of 7 per cent five-year bond-secured gold notes to finance the growth of greater Milwaukee's electric service system. The notes are being offered at par for cash. It is explained to the subscribers that there is no accrued interest to pay. Interest is payable May 1 and Nov. 1. The notes are due on Nov. 1, 1923. The sales office is at the securities department on the ground floor of the company's building in Milwaukee. Out of town buyers are advised to order through their home banks or direct from the company. The notes are in denominations of $50, $100, $500 and $1,000. The company says that to Dec. 31 more than 1000 Milwaukee and Wisconsin investors bought 126 of the $50 notes, 587 of the $100 notes, 204 of the $500 notes and 540 of the $1,000 notes, or a total of $707,000. Of the two weeks' total $645,000 was bought by Milwaukee people.

Hamilton Radial Line Suspended.—The Hamilton (Ont.) Radial Electric Railway, a 29.1-mile subsidiary of the Dominion Power & Transmission Company, has suspended its service. It is reported that proceedings are being taken in the Exchequer Court to declare the company insolvent and that this will probably result in operation being abandoned and the rails taken up. The company was confronted by an order from the Dominion Railway Commission to furnish the service designated by the by-laws of the municipalities through which it operated. It had failed to secure increased fares, notwithstanding the fact that it furnished proofs that it had been operating at a heavy loss and had attempted to curtail service. Although the commission ordered service to be given in accordance with the city regulations, it announced that the scope of its authority is not sufficient to compel a company to operate at a loss if it chooses to discontinue entirely. The municipalities are now considering acting upon the commission's advice to attempt purchase and public operation.

Electric Railway Monthly Earnings

BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, ME.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '18	$80,930	*$53,243	$27,687	$20,223	$7,464
1m., Nov., '17	76,081	*38,838	37,243	19,667	17,586
12m., Nov., '18	923,978	*584,563	339,415	238,490	100,925
12m., Nov., '17	876,070	*498,516	377,554	227,430	150,124

CHATTANOOGA RAILWAY & LIGHT COMPANY,
CHATTANOOGA, TENN.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '18	$167,118	*$130,580	$36,538	$29,470	$7,068
1m., Nov., '17	111,216	*112,519	†1,303	30,866	†32,169
12m., Nov., '18	1,799,071	*1,439,428	359,643	374,599	†14,956
12m., Nov., '17	1,335,115	*1,096,202	238,913	358,507	†119,594

COLUMBUS RAILWAY, POWER & LIGHT COMPANY,
COLUMBUS, OHIO

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '18	$370,981	*$281,923	$89,058	$64,189	$24,869
1m., Nov., '17	359,990	*286,827	73,163	45,919	27,244
12m., Nov., '18	4,232,018	*3,117,986	1,114,032	681,840	432,192
12m., Nov., '17	3,975,871	*2,853,469	1,122,402	552,618	569,784

COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY,
GRAND RAPIDS, MICH.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '18	$2,022,847	*$1,322,140	$700,707	$526,397	$174,310
1m., Nov., '17	1,822,283	*1,186,101	636,182	466,230	169,952
12m., Nov., '18	21,735,128	*14,862,014	6,873,114	5,951,761	921,353
12m., Nov., '17	19,460,726	*11,919,695	7,541,031	5,255,160	2,285,871

CUMBERLAND COUNTY POWER & LIGHT COMPANY,
PORTLAND, ME.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '18	$276,504	*$198,562	$77,942	$71,147	$6,795
1m., Nov., '17	243,036	*170,398	72,638	69,843	2,795
12m., Nov., '18	3,190,106	*2,302,101	888,005	826,461	61,544
12m., Nov., '17	3,078,224	*2,036,623	1,041,601	816,409	225,192

EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net income
1m., Nov., '18	$366,551	*$282,373	$84,178	$70,563	$13,615
1m., Nov., '17	329,267	*223,856	105,411	66,944	38,467
12m., Nov., '18	4,167,018	*3,217,484	949,534	812,237	137,297
12m., Nov., '17	3,630,797	*2,422,740	1,208,057	779,247	428,810

GRAND RAPIDS (MICH.) RAILWAY

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net income
1m., Nov., '18	$105,622	*$92,143	$13,479	$19,656	†$6,177
1m., Nov., '17	100,702	*77,401	23,301	18,619	4,682
12m., Nov., '18	1,277,930	*1,016,375	261,555	234,120	27,435
12m., Nov., '17	1,305,807	*884,788	421,019	216,010	205,009

LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY,
LEWISTON, ME.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net income
1m., Nov., '18	$76,707	*$66,897	$9,810	$19,824	†$10,014
1m., Nov., '17	71,307	*57,327	13,980	15,457	†1,477
12m., Nov., '18	877,491	*783,452	94,039	223,540	†129,501
12m., Nov., '17	899,313	*672,771	226,542	186,425	40,117

NASHVILLE RAILWAY & LIGHT COMPANY, NASHVILLE, TENN.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net income
1m., Nov., '18	$271,939	*$184,351	$87,588	$38,631	$48,957
1m., Nov., '17	212,264	*134,094	78,170	40,628	37,542
12m., Nov., '18	2,812,103	*1,834,609	977,494	483,411	494,083
12m., Nov., '17	2,452,118	*1,577,178	874,940	492,061	382,879

PORTLAND RAILWAY, LIGHT & POWER COMPANY,
PORTLAND, ORE.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net income
1m., Nov., '18	$636,539	*††$409,714	$226,825	$185,657	$41,168
1m., Nov., '17	525,811	*324,600	201,211	177,512	23,699
12m., Nov., '18	7,519,407	*††4,890,451	2,628,956	2,208,330	420,626
12m., Nov., '17	5,942,084	*3,354,411	2,587,673	2,156,100	431,573

* Includes taxes. † Deficit. †† For the month, $19.020; and for twelve months, $358,468, included for depreciation.

Traffic and Transportation

Baltimore Fare Confirmed

Maryland Commission Sustains Six-Cent Emergency Rate Which Has Been in Effect Since October

The Public Service Commission of Maryland has ratified the 6-cent fare of the United Railways & Electric Company, Baltimore, put into effect by the company on Oct. 1.

The commission has likewise ratified the increase to 6 cents in the fare charged on the buses of the Baltimore Transit Company, a subsidiary of the United Railways & Electric Company.

NEW RATE UNTIL DECEMBER

In ratifying the increase in car fare the commission stipulated that this action permitted the larger fare until Dec. 31, 1919, and that the continuance of a 6-cent fare after that date depended upon circumstances.

In its opinion the commission said:

"The company will be required by the commission's order to make regular monthly reports of its operating results under the new rates, and if it appears at any time that a reduction of less than the full 1-cent increase can be properly required, such reduction will be made in the sale of tickets in small quantities at such prices as may be deemed expedient from time to time. This commission has decided from the facts before it in this case that the fair worth of reasonably adequate street railway service to the community served by the respondent company and under existing conditions is 6 cents as the basic rate for adults, and 4 cents as the basic rate for children between four and twelve years of age."

I. T. S. Express Service

Plans for an exclusive express service on the Illinois Traction System electric railway lines are being made by H. E. Chubbuck, vice-president executive. Although the details of the new service have not yet been worked out it is understood that the traction lines will announce a complete express service on all of its several divisions within the next few weeks.

For several years the Adams and American Express Company service was offered on the traction lines and with the taking over of the express companies by the American Railway Express Company this service has been continued. It has been the policy of the government-operated express company, however, to divert most of the express business to the government-operated steam roads, with the result that practically all of this express business has been taken away from the electric carriers.

The territory served by the traction lines is said to be sadly in need of express service and it is with the idea of offering such service that the Illinois Traction System is now planning the innovation. The direct supervision of the new express department will be in charge of C. F. Handshy, assistant general manager of the interurban properties of the company.

Jersey Sounds Warning

A warning has been sounded by the Board of Public Utility Commissioners of New Jersey in its annual report, against the tendency to have legislation enacted amending the powers of the commissioners to abrogate contracts between municipalities and railway, gas and electric companies in questions involving rates and fares to be charged. The report says that such an amendment might work a hardship upon the patrons and customers of these public utilities. In this connection the report says:

"The larger utilities, in order that the number of their customers might be increased, or to preserve uniform rates throughout territories served by them, voluntarily fixed rates much lower than those specified in the franchises of many of the municipalities in which they operate. The rates so fixed by them cannot now be increased against the prohibition of the Board of Public Utility Commissioners. If, however, the Legislature should declare that these grants must be regarded as contracts with which orders of the Public Utility Commission shall not interfere the public utilities would be free to exercise their own judgment as to what rates they would impose provided they kept within the limits set forth in the franchises.

"It seems to us that with such a condition existing the utilities in many cases could so increase their existing rates as to impose a decided burden upon those who have adapted themselves to the use of their services. Having, to use a commercial expression, their trade established they would be, if not subject to regulation, in a position, while acting within franchise limitation, to make increases that would be neither necessary nor reasonable, but which their customers would pay rather than suffer the loss and inconvenience resulting from discontinuance of the service."

If the companies do not improve service voluntarily now that the war is over a warning is sounded by the Utility Commissioners that the companies will be required to do so. The same is said in connection with the making of improvements and needed extensions to give proper facilities for service.

Inter-company Transfers

Washington Railways Ordered to Exchange Transfers at Thirteen Important Points

An order was issued by the Public Utilities Commission of the District of Columbia on Jan. 15 providing for free intercompany transfers at thirteen important intersections of the lines of the Capital Traction Company and the Washington Railway & Electric Company. Reciprocal transfers were also ordered at Twelfth Street and Pennsylvania Avenue between the lines of the Washington-Virginia Railway and the Capital Traction Company.

Except at three points, where it was feared that the congestion difficulties would offset transfer advantages, the recommendations of John A. Beeler, traffic expert of the commission, were followed. The order becomes effective on Feb. 1.

There are certain limitations on the transfers to be granted, to prevent round-trip riding on one fare. A general limitation imposed for the same reason is that no transfer can be obtained on an intercompany transfer except on a cash fare. This does not prevail where transfers are now granted on transfers between the various lines of any one company.

The Washington, Baltimore & Annapolis Railroad is not mentioned in the order and there is considerable speculation as to whether it will be required under the order to issue transfers to Capital Traction lines at points where the Washington Railway & Electric Company is compelled to do so. This suburban line has no District franchise, operates on the lines of the Washington Railway & Electric and now grants transfers to the lines of that company. What attitude the Washington-Virginia Railway will assume also is a matter of speculation. The other companies agreed at the hearing that they would oppose no legal objection to whatever action the commission might take. The Washington-Virginia Company does not do much business in the District and did not ask for an increase to the 5-cent fare, although it willingly accepted the advance when it was granted.

The order provides for the discontinuance of 2-cent transfers and "duplex" tickets being issued at points where free transfers are to be granted.

Express Rates Advanced

The Galveston-Houston Interurban Company announced that on Jan. 1 an increased baggage and express rate would be charged on shipments between Galveston and Houston and intermediate points. The rate for first-class interurban express between Galveston and Houston was formerly 45 cents per 100 lb. The new rate on the same shipment is 60 cents per 100 lb. There was also a rate of 25 cents per 100 lb. on shipments of 1000 lb. or over, and this rate was increased to 35 cents per 100 lb.

New Bay State Fares in Effect

Details Are Given of the Instructions to Conductors in Regard to the Zone Rates Effective from Jan. 8

The new fare tariff of the Bay State Street Railway, Boston, Mass., went into effect on Jan. 8 on the entire 950 miles of line. In every car and in every transfer station on the company's lines, tickets were placed on sale at 7 cents each, in strips of five. Passengers who prefer the cash arrangement pay 10 cents. The new city zones extend in general to the limits of the former 8-cent fare. Outside the city zones two of the former interurban mileage zones are in general coupled together to form the new interurban zone. The statement of fares made by the company in its general instructions for fare collection is as follows:

FARES

The rate of fare in the city zones is 10 cents cash or a 7-cent zone ticket (Form 1198), both with transfer privilege to the new city zone limits.

The rate of fare in the interurban zones is 5 cents cash for each zone with a minimum fare of 10 cents cash, good for any part of two zones, or a 7-cent zone ticket, good for one zone only.

The cash fare between a city zone and the first interurban zone is 15 cents, or using a 7-cent zone ticket in the city, is 12 cents.

The following other new tickets are good for fare:

(a) Limited commutation tickets (Form No. 1200) supersede the present workingmen's tickets and are good only in the hours formerly established for workingmen's tickets. This ticket has a city zone coupon and an interurban zone coupon, the later notched to show the number of zones for which it is good beyond the city zone limit.

(b) Pupils' tickets, Forms No. 1135, 1175 for day school pupils in city zones and No. 1173 for evening school pupils in city zones. For interurban zones No. 1202 for one zone, No. 1179 for two zones, No. 1180 for three zones and No. 1181 for four zones, all being for day school pupils unless stamped for evening school. Form No. 1178 is for a ride between the city zone and interurban zone and is notched to show the number of interurban zones.

(c) Complimentary tickets, police and employees' tickets the same as heretofore.

All workingmen's tickets, reduced rate tickets and other forms of city and suburban tickets heretofore in effect are no longer good for fare, and passengers presenting such forms must be so advised. Old tickets will be redeemed at their pro-rata value upon presentation at the offices of the company or other designated points.

In each carhouse are posted samples of tickets that are good for fare and no other forms must be accepted. Coupons from any new ticket with the exception of the 7-cent zone ticket (3 for 35 cents) to be good for fare must be presented with ticket or cover of same number. *All tickets when collected by hand MUST be cancelled with the hand punch in the presence of the passenger.*

Passengers in the city zone are in all cases to board by rear door. At transfer or other busy points, conductors announce "Please leave by forward door." On cars with folding doors passengers may leave by either door but it is the desire of the company to encourage the use of the front door. On cars without folding doors passengers leave by the rear door except that front door may be used when more convenient on a crowded car.

The instructions of the company in regard to fare collection follow:

FARE COLLECTION

Conductors are required by law to sell 7-cent tickets but only in strips of 5 for 35 cents—single tickets will not be sold. Transfers will be issued only at time fare is paid and will be collected by hand but not registered, and will be deposited in trip turn-in envelope at the end of each half-trip.

LINES ENTIRELY WITHIN CITY ZONE

Plan I. Prepayment operation of cars equipped with fare boxes.

Cars will be equipped with a fare box having two compartments, one for cash and the other for all revenue and free tickets.

Conductors will stand by the fare box and see that all passengers pay fare on entering. Cash and ticket fares will be deposited by passenger in proper compartment of fare box. Conductors are not permitted to handle fares but will issue change when requested.

Fares deposited in fare box will not be registered.

When cars are equipped with *ticket box only* passengers will deposit all revenue and free tickets in box as they board car and conductor will collect cash fares by hand and register them on "10-cent cash register."

Plan II. Closed and open cars when operated without fare boxes.

Cars will be equipped with two overhead registers—one for 10-*cent cash fares* and the other for *revenue tickets only.*

Conductors must collect fares from passengers as soon after they board car as possible. All cash fare collected must be rung up on "10-cent cash register." Revenue tickets must be cancelled with the hand punch in the presence of the passenger and rung up on "ticket register." Free tickets and transfers will not be registered but must be deposited in trip turn-in envelope at the end of each half-trip.

FARE COLLECTION—ROUTES EXTENDING BEYOND CITY ZONE LIMIT

Plan III. Prepayment operation of cars equipped with fare boxes.

Cars will be equipped with a fare box having two compartments—one for cash and the other for all revenue and free tickets for use in connection with initial fares, also one overhead register for revenue tickets only collected on inside collections, and a *Rooke register* for inside cash fare collections in interurban territory. See special rules governing use of Rooke register.

CITY ZONE COLLECTIONS—OUT BOUND

City zone collections will be handled in the same manner as on cars that operate on routes entirely within the city zone.

On reaching city zone limit conductor must post day card.

INTERURBAN COLLECTIONS

After passing city zone limit conductor must enter car and collect zone fares zone by zones. Each zone must be collected separately, starting from the front of cars with folding doors and from the rear of others. Five-cent cash fares *must be deposited by passenger in Rooke register* and revenue tickets collected by hand, cancelled in the presence of the passenger and rung up on ticket register. Free tickets and transfers will not be registered but will go in trip turn-in envelope.

Revenue tickets that entitle passengers to ride beyond the limit of the first outer zone must be picked up and an identification check (Form 1042) issued to such passenger punched for the number of zones the passenger is entitled to ride, i. e. if a limited commutation ticket notched for three interurban zones is collected in the first interurban zone, conductor will pick up ticket, cancel it and ring it up on ticket register and issue identification check with three punch marks in it as a means of identification for the next two zones through which passenger is entitled to ride.

As soon as collection is completed conductor must return to rear platform and collect fares from passengers boarding car in the following manner:

PASSENGERS BOARDING CAR IN INTERURBAN ZONE

Conductor will see that passengers deposit initial cash fare of 10 cents, or 7-cent ticket, in proper compartment of fare box. To passengers depositing 10 cents cash, issue an identification check without punch marks except for conductor's own identification so that he will know when he picks it up that it is one he has issued.

All forms of tickets, whether revenue or free must be deposited in ticket box and if ticket so deposited entitles passenger to ride beyond the next interurban zone limit conductor must issue identification check properly punched so that he will know the limit to which fare has been paid.

Interurban transfers will be collected by hand and put in trip turn-in envelope together with other city zone transfers heretofore collected.

Passengers boarding car in first interurban zone outside of approaching city zone must declare themselves as to destination. If going into city zone passengers will deposit 15 cents or 5 cents and 7-cent ticket in fare box and receive identification checks, otherwise 10 cents cash fare or 7-cent ticket must be deposited in fare box.

Interurban transfers will be issued at time of payment of fare for one of two purposes:

1. As a free transfer to permit passengers to reach point on connecting route to which free transfers are issued as provided for in general order No. 118.

2. To so collect fares that passengers will not be required to pay the minimum fare for only one zone when their whole ride will be more than one zone, but part of the trip involves riding one zone of the routes. In such a case the first conductor will collect, in addition to the fare on his own route, fare for one zone on connecting route (through Rooke register) and issue transfer punched for one zone.

At change-off points in interurban territory designated by local division orders conductors will issue to passengers on last collection an interurban transfer punched only as to time and direction which will indicate to conductor taking car that passenger is entitled to pay only a single zone fare. Fares of passengers boarding car at such points will not be collected prepayment but by conductor when making first zone collection.

On reaching city zone limit conductor must post day card for register readings of fare box, Rooke register and ticket register, and also note in proper column his best judgment of the number of 7-cent tickets deposited in ticket box in interurban territory.

CITY ZONE COLLECTION—IN BOUND

Having posted these readings conductor will enter car and collect city zone fare starting from the front of cars with folding doors and from the rear of others. Ten-cent cash fares must be collected through the Rooke register and tickets by hand. Revenue tickets must be rung up on ticket register and cancelled in the presence of the passenger from whom they are collected.

Passengers boarding car after passing city zone limit will board by rear door and collections must be handled in same manner as on any route entirely within city zone.

On reaching end of route conductor must post day card for reading of fare box register, Rooke register and ticket register and fill out trip turn-in envelope for free tickets and transfers collected enroutes, entering these on day card in proper column.

Plan IV. Closed and open cars without fare boxes.

Cars are equipped with two overhead registers, one for 10-cent cash fares and the other for revenue tickets, and a Rooke register for all cash fares collected in interurban zones and on in-bound trips to city zone and the city zone fare of passengers on car crossing the city zone limit.

CITY ZONE COLLECTIONS—OUTBOUND

City zone collections will be handled in the same manner as on cars that operate on routes entirely within the city zone as shown under Plan II.

On reaching city zone limit conductor must post day card for ticket register and for Rooke register.

INTERURBAN COLLECTIONS

Follow the same plan as outlined previously for prepayment cars with the following exceptions—i. e. all cash collected from passengers boarding cars must be deposited in Rooke register and all revenue tickets collected must be rung up on ticket register.

Approaching city zone limit conductor must post day card for ticket register and Rooke register.

CITY ZONE COLLECTIONS—IN BOUND

City zone collections will be handled in same manner as on prepayment cars and passengers boarding in city zone will have their fare collected as already outlined for closed and open cars without fare boxes operating on routes entirely within city zone.

> On reaching end of route conductor must post day card for reading of 10-cent cash register, ticket register, Rooke register and fill out trip turn-in envelope for all free tickets and transfers collected enroute, entering these on day card in proper column.

In a statement to the public the company said that every effort was being made to make the system of fare collection and registration as simple as possible so that the conductors would be able to adhere to the rules and passengers be certain that their fares were properly accounted for. Cars are being provided with prepayment devices as rapidly as possible and the co-operation of the car riders was asked in making their use a success.

New York Request Refused

Board of Estimate Rejects Plea for Increased Fares on Rapid Transit and Surface Lines

The Board of Estimate of New York City on Jan. 10 formally denied the application of the Interborough Rapid Transit Company to be permitted to charge an 8-cent fare on the subways and elevated, and that of the New York Railways for the right to charge 8-cent fares with 3 cents for transfers on the "green car" surface lines. A lengthy resolution, unanimously adopted by the board, in regard to the Interborugh, said in part:

> The contract with the city is the foundation upon which the Interborough's securities rest. It is proposed, however, that the compensation of the Interborough be increased 60 per cent; that is, that it be permitted to receive an 8-cent fare instead of a 5-cent fare, as provided in the contract. In other words, the municipal authorities are asked to sanction an arrangement whereby every fare payer is taxed 3 cents to prevent any loss whatever falling upon Interborough security holders by reason of deficiency of income due to the war or other causes.
>
> There appears to be no reason why the burdens caused by the war, or otherwise, should thus be shifted from the holders of the Interborough securities to the traveling public. There is no pretense that the income from a 5-cent fare is not sufficient to meet all operating or other current expenses. It is merely the question of whether the Interborough's security holders shall receive income not earned, or whether they shall wait for it according to the terms of their investment.
>
> If the Interborough desires to cancel the present contract, terms can doubtless be agreed upon that will take into consideration the actual cash investment of the Interborough in the property, and avoid the necessity of the complete wiping out of the equities of its security holders, which otherwise must inevitably result if the present claims of the Interborough are true.
>
> When the City of New York made the contract with the Interborough, it was upon the assumption that the Interborough was of sufficient financial responsibility to perform its obligations and would do so in good faith, giving to the public the benefit of the 5-cent fare for the forty-nine year period of the contract. It would be a matter of very serious concern to the members of the Board of Estimate and Apportionment, if the Interborough, either from unwillingness to perform its contract obligations, or lack of financial responsibility, should, as has been threatened by its representatives, seek the advantages of a receivership.

After the resolution had been read, Mayor Hylan remarked:

"In other words, if the Interborough is unable to comply with all of the terms of its contract with the city, all they have to do is to turn the lines back to the city and the city will operate them."

Atlanta Appeal Renewed

The Georgia Railway & Power Company, Atlanta, Ga., on Jan. 6 presented to the Council a petition asking for an increase in fares from 5 cents to 7 cents. The filing of this request was the most important feature of the last business session held by the City Council of 1918. This paper, together with communications from the National War Labor Board and from ex-Governor Joseph Brown, both dealing with the railway situation in Atlanta, were ordered filed, and Council then adjourned to again meet on the evening of the same day for the last time, at which time Mayor James L. Key was inaugurated and the Council of 1919 took charge of the affairs of the city.

The petition of the railway company, which asked for an increase of 7 cents instead of 6 cents as sought for formerly, as well as the other papers on the subject from Governor Brown and the War Labor Board, were not even read to the Council but were ordered filed.

The petition declares that the company must have immediate relief from its financial burdens if it is to maintain efficient service, and that because of the added burden that has been placed upon it by the increased pay awarded its employees by the War Labor Board, and because of the other greatly enhanced expenses, the company must have an increase in fares to 7 cents, as 6 cents will not be sufficient to bring the needed revenue. The increase asked for, the company says, is to continue only until normal conditions are restored.

Status of Kansas City Fare Case

The favorable decision of Dec. 31 by the Supreme Court of Missouri in the 6-cent fare case of the Kansas City Railways will probably not be effective for several weeks. The city is expected to file a petition for a rehearing by the Supreme Court. If it should fail in this, the city will file an appeal to the United States Supreme Court.

Should the State Supreme Court decide that the matter is not a federal one, the State Supreme Court may then order the conclusion of the matter. This will involve the disbursement of the excess 1 cent fare collected and impounded in Missouri, a sum which on Jan. 7 amounted to about $300,000. It is possible that even if an appeal is granted to the United States Supreme Court, the state court may order the disbursement of the money so far accumulated, and require the company to give a bond, instead.

There was temporary confusion in Kansas City because on some of its lines the railways was not giving the transfers bearing coupons, the day or so following the decision. It was explained that the lack of rebate coupons was an oversight. Coupons are now attached to all transfers.

The action of the Public Service Commission of Missouri in the 6-cent fare case of the Kansas City Railways was upheld in a decision written by Judge Blair and concurred in by other members of the Supreme Court of Missouri. Judge Blair pointed out that it was a matter of common knowledge that franchise street-railway rates existed generally, and that the Legislature passed the utilities act in view of this situation. For this reason Judge Blair held it would be absurd to accept the city's contention that the commission did not have rate regulatory power. Shortly after the decision was rendered the company said that "the court's ruling would appear to settle for all time the question of whether the Public Service Commission has the power to fix public utility rates."

Autos and Railways Co-operate

The Public-Service Commission of Illinois has issued an order granting a certificate of convenience and necessity for the transportation by motor trucks of freight, baggage and express between the freight terminal station of the Aurora, Elgin & Chicago Railroad at Laramie Avenue, in Chicago, and the Chicago, North Shore & Milwaukee Railroad at its terminal station in the city of Evanston, and the freight terminal of the Chicago & Interurban Traction Company at Eighty-eighth and Vincennes Avenue, Chicago, and between the freight station of the Chicago & Joliet Electric Railway at Archer and Cicero Avenues, Chicago, and the central freight station to be established by petitioner in the city of Chicago. The order authorized the issuance of capital stock in the amount of $10,000.

Objection was filed by the officers of the Chicago, Waukegan & Hammond Transportation Company because that company was granted a certificate of convenience and necessity to operate motor trucks for the transportation of freight and express between Chicago, Waukegan and Hammond and had ample facilities to haul all the goods offered for transportation between the points the Interurban Motor Despatch Company desired to operate. The commission overruled the objection on the ground that the character of the business to be conducted by the petitioner was different from that being carried on by the objector.

Old Fare Resumed in Columbus

On Jan. 9 the Columbus Railway, Power & Light Company, Columbus, Ohio, resumed the old rate of fare of eight tickets for 25 cents. Some few months ago the company put into effect a flat 5-cent rate, announcing at that time that it proposed to surrender its franchise as imposing conditions considered too onerous. This matter of the policy of the management with respect to rates has recently been injected into the contest for control of the company and is referred to in connection with the changes in the management of the company noted elsewhere in this issue.

Transportation News Notes

Wants Two Men Per Car.—The City Commission of Waco, Tex., has instructed the city attorney to draft an ordinance requiring the Texas Electric Railway, which operates in Waco, to maintain two men, a motorman and a conductor, on all cars in that city.

Akron Increase Up Soon.—The question of an increase in fare for the Northern Ohio Traction & Light Company in Akron, Ohio, will shortly come before Council on the report of Hagenah & Erickson, Chicago, Ill., who made an investigation of the need of an increased income from the local service.

Rhode Island Hearing Postponed.—The hearing in the Supreme Court of Rhode Island on the appeals of the towns of East Providence, North Providence, Johnston and Warwick from the Public Utilities Commission's authorization for the Rhode Island Company to increase fares, which was to have been held on Jan. 19, was again postponed to Jan. 27, because of the illness of the Rhode Island Company's attorney, G. Frederick Frost.

School Commutation Books.—The Syracuse (N. Y.) Northern Electric Railway, under special permission of the Public Service Commission for the Second District, will sell school commutation books, each book good for fifty single trips and limited as to use to thirty-five days from and including the date of purchase, on a basis of 1½ cents per mile, minimum $3 per book. No school commutation books have heretofore been issued.

Seven-Cent Zones on Northampton Line.—Announcement was made on Jan. 3 of the authorization by the Public Service Commission of Massachusetts of an increase in fares from 5 cents to 7 cents on the Northampton Street Railway. The advance will go into effect on Jan. 30 without changes in the present fare zones. The lines between Northampton and Easthampton and Williamsburg are affected as well as those in the city itself.

66 Per Cent Fare Increase Reasonable.—The Public Service Commission of Washington holds to be justified an increase of fare on the North Coast Power Company's railway from Vancouver to Sifton. The new rate is held not unreasonable, in comparison with the company's earnings and expense. The commission has dismissed complaints. The new schedule increases the through fare from 15 cents to 25 cents and allows graduated increases for way points.

Amends Its Fare Appeal.—The Arkansas Valley Railway, Light & Power Company, Pueblo, Col., which has had an application before the Public Utilities Commission of Colorado for permission to raise fares from 5 cents to 6 cents, has filed an amended application asking for a 7-cent fare. The company says a 6-cent fare will not prove sufficient to meet increased costs of operation inasmuch as the War Labor Board advanced the wages of trainmen effective as of Jan. 1.

I. T. S. Changes Traffic Headquarters.—Effective shortly after the first of the new year the headquarters of the traffic department of the Illinois Traction System will be moved from Springfield, Ill., to Peoria, Ill. For several years both the freight and passenger traffic departments have been located in Springfield, but under the new order the heads of these divisions and their assistants will be located in Peoria. Arrangements are now being made for their removal.

Shuttle as an Economy.—With the statement that it is making every effort to reduce operating expenses so that it will not be necessary to ask for an increase in passenger rates, the Los Angeles (Cal.) Railway Corporation recently announced that a new schedule would be used on a number of the more congested lines. On nine of the principal lines half of the cars will be run to certain designated points and will then be turned back and shuttle cars will operate from those points to the end of the lines.

Six Cents in Rome and Athens.—Increases in fares in Rome and Athens, Ga., in gas rates in Macon, and in electric light and power rates in Athens, Rome, Conyers and Lithonia have been authorized by the State Railroad Commission. In both the instances where the commission increased the rate a straight fare of 6 cents was substituted for the prevailing 5-cent fare to offset an increase in operation cost. The companies affected by the fare increase are the Athens Railway & Electric Company and the Rome Railway & Light Company.

Three Fives for Two Sixes.—The Public Service Commission for the Second District of New York on Dec. 20 ordered suspended for thirty days or until and including Feb. 4, the rates which the Fishkill Electric Railway proposed to put into effect on Jan. 6. Commissioner Cheney planned to hold a hearing in Beacon on Jan. 8. The suspended tariff, to which reference was made in the ELECTRIC RAILWAY JOURNAL for Dec. 14, page 1071, divided the railway into three fare zones, two with a 5-cent fare and one 6 cents, instead of two 6-cent zones.

Press Comments Reprinted.—Theodore P. Shonts, president of the Interborough Rapid Transit Company and the New York (N. Y.) Railways, has reprinted in a pamphlet of forty pages public opinion on the traction problem as represented in leading editorials in the daily papers and has included as part of the record three letters to the Board of Estimate, Public Service Commission and civic organizations with respect to transit matters. In concluding his appeal to the public, Mr. Shonts says that the situation was presented in detail in the letters to the public authorities reprinted in the pamphlet and "of them we bespeak your careful reading."

Rome Fare Case Started.—Upon the request of the New York State Railways the Public Service Commission for the Second District fixed upon Jan. 15 for an investigation of the company's petition for a 6-cent fare in Rome. The proceeding will be under the company's original petition for permission to increase its fare to 6 cents in Rochester, Syracuse, Utica, Rome, Oneida and Little Falls. Under the Court of Appeals decision in the Quinby case the company has been denied a 6-cent fare in Rochester, while in Utica and Syracuse the 6-cent fare is in effect. The company's petition relating to Rome, Oneida and Little Falls is pending before the commission.

Six-Cent Fare Remains.—The City Council of Beaumont, Texas., has adopted a resolution killing all proposed ordinances to repeal the 6-cent fare and to restore the fare of 5 cents. This action was taken by the Council after thorough investigation of the Beaumont Traction Company's earnings, the kind of service furnished, and complaints against service. The City Council some time ago, on petition of the company, enacted an ordinance authorizing a fare of 6 cents. This was immediately attacked by the traveling public, who charged that the promise of the company to improve its service had not been carried out. These complaints were investigated. An agreement was then reached whereby the company will make specific extensions and improvements on condition that the 6-cent fare ordinance would not be repealed.

Worcester Wants Seven Cents.—Officials of the Worcester (Mass.) Consolidated Street Railway have thrown their books open to Francis L. Blacker, an accountant employed by the Mayor to investigate the justice of the petition to the Public Service Commission for a 7-cent fare on the forty-six routes in Worcester and its suburban districts. Mr. Blacker has made a first report, showing that from what he has learned from the examination made by him to date and the information received from the officials of the railway the 7-cent fare will just permit the company to meet its expenses of operation and upkeep. He has been directed to make still further inquiry into the matter and to submit a written report to the Mayor as soon as possible. On the final report of Mr. Blacker, Mayor Holmes will make his decision on the question of the advisability of making official protest to the Public Service Commission against the proposed increase to 7 cents. The tariff of the company increasing the fare from 6 cents to 7 cents was filed with the Commission on Jan. 11 to become effective on Feb. 1.

Personal Mention

W. J. McCoy has been appointed treasurer of the Union Traction Company, Sistersville, W. Va., to succeed H. W. McCoy.

Samuel Ungerleider has been elected vice-president of the Columbus Railway, Power & Light Company, Columbus, Ohio.

Henry M. Brooks has been appointed secretary of the Seattle & Rainier Valley Railway, with headquarters at Chicago, Ill., to succeed M. Murphy.

Walter N. Munroe, general manager of the Paris (Tex.) Transit Company, has also been elected vice-president of the company to succeed C. E. Calder.

E. H. Adams has been appointed comptroller of the British Columbia Electric Railway Company, Ltd., Vancouver, B. C., to succeed W. Saville.

G. W. Smith has been appointed superintendent of maintenance of way of the San Antonio (Tex.) Public Service Company to succeed A. M. Courtney.

William Perdue has been appointed superintendent of the Montgomery Light & Traction Company, Montgomery, Ala. Mr. Perdue has been connected with the company for many years.

H. C. Onwald has been appointed secretary of the Lake Erie & Northern Railway, Brantford, Ont., to succeed Lloyd Harris, who last spring was appointed chairman of the Canadian War Mission to the United States.

Roy G. Smock, city railway supervisor since the Des Moines (Iowa) City Railway secured its new franchise three years ago, has resigned effective on March 1 and will go to Waterloo, Iowa, where he is president of the Cedar Falls Sand & Gravel Company.

Charles L. Kurtz, who has had long experience in the light and power business and in electric railway matters, has been elected president of the Columbus Railway, Power & Light Company, Columbus, Ohio, to succeed Samuel G. McMeen, resigned, who has also retired as a director as noted elsewhere in this issue.

J. S. Goodrell has been named by the City Council of Des Moines, Iowa, as successor to Roy G. Smock, who will retire on March 1 as city railway supervisor. Mr. Goodrell was for a number of years master mechanic for the Des Moines City Railway, but for the last year or more has been an inspector on government work.

J. P. Lake has recently entered the employ of the Bay State Street Railway, Boston Mass. He will have charge of the power saving department, which has been organized in connection with the installation and operation of approximately 1500 Economy railway meters. Mr. Lake formerly was with the Pacific Electric Railway, Los Angeles, Cal., as engineer in the efficiency bureau.

C. A. Hall has been promoted from assistant general manager to general manager of the Eastern Pennsylvania Railways and the Eastern Pennsylvania Light, Heat & Power Company, Pottsville, Pa., by the J. G. White Management Corporation, New York, N. Y., the operating managers of the Pottsville properties. Mr. Hall succeeds L. S. Cairns, deceased. In June, 1918, Mr. Hall entered the service of the two Eastern Pennsylvania Companies as manager of the electric light and power department and shortly thereafter was advanced to the position of assistant general manager. After leaving school in 1904, Mr. Hall entered the employ of the Consolidated Light Company, Huntington, W. Va. In 1907 he joined the organization of the Ohio Valley Electric Railway, Huntington, W. Va. He became superintendent of the Canonsburg Electric Light, Heat & Power Company, Canonsburg, Pa., in 1909, and following the purchase of this utility in 1911 by the West Penn Power Company, Pittsburgh, Pa., he was appointed local manager of that company in charge of the Canonsburg territory. Under Mr. Hall's management this property was entirely rebuilt and many improvements were made to the service.

C. A. HALL

William Clough has resigned his position as manager and engineer of Bury (England) Corporation Tramways in order to take up an important post with a large firm of paper makers. He has been manager since the municipality took over the tramways about sixteen years ago. In recognition of his work in connection with the production of munitions of war he was made a member of the Order of the British Empire. He also earned the commendations of the Admiralty for his work in the Shipyard Labor Department.

Joseph L. Tulley has been appointed division superintendent of the Worcester division of the Worcester (Mass.) Consolidated Street Railway. His new title will not alter the scope of his work, as he has been acting as superintendent for the last two years, during the illness of the late John B. Gorman. Mr. Tulley has been in the employ of the company for fifteen years, serving first as clerk and rising through the various grades to his present position.

Harry H. Lindley, chief clerk to the auditor of the Union Traction Company of Indiana, Indianapolis, Ind., has resigned to accept a position as office manager of the Lindley Box & Paper Company, Marion, Ind. Mr. Lindley entered the service of the railway in September, 1906, as bookkeeper, which position he held about three years, succeeding A. C. Moore as chief clerk late in the year 1907. Mr. Lindley's friends in the accounting department presented a leather traveling bag to him to speed him on his way.

Brig.-Gen. George H. Harries, head of the American commission for the repatriation of war prisoners, is reported in a dispatch from Amsterdam to have been narrowly missed by a bullet as he sat in his room at the Hotel Adion, Berlin, during the street fighting there on Jan. 11. General Harries, who in civilian life was a vice-president of H. M. Byllesby & Company and a former president of the American Electric Railway Association, was the ranking member of the three American officers first to reach Berlin after the signing of the armistice.

Major Samuel W. Greenland has received his honorable discharge from the chemical warfare section of the United States Army and has returned to take up his duties as general manager of the Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind. During his absence from the railway, Major Greenland has been supervising the erection of a 20,000-kw. steam-driven generating station and a rotary station of the same capacity, at Edgewood (Md.) Arsenal. He also looked after the operation of the utilities at Edgewood.

Charles B. Stiffler, formerly traveling auditor of the Union Traction Company of Indiana, Indianapolis, Ind., but for the past sixteen months in the United States Army service, has accepted the position made vacant by the resignation of Harry H. Lindley as chief clerk to the auditor. Mr. Stiffler has had considerable experience in accounting work, having been connected with the accounting department of the Indianapolis & Cincinnati Traction Company for a period of seven years and with the Union Traction Company about eighteen months prior to entering the army.

Homer C. Bender has been appointed Superintendent of Public Utilities of Spokane, Wash., by Mayor C. M. Fassett. This is a new position provided for in the 1919 budget. Mr. Bender will be employed in making personal investigations, gathering data, inspecting utility work under way and in preparing for rate and other hearings before the Public Service Commission. Mr. Bender is a graduate of the Massachusetts Institute of Technology and has had four years' experience with the Stone & Webster interests in hydroelectric work. He has also had general engineering experience and has worked in the natural gas fields in Alberta.

Emil G. Schmidt, president of the Des Moines (Iowa) City Railway and the Inter Urban Railway, Des Moines, has announced that when the receivership of the Des Moines City Railway is lifted he will retire from active work in the electric railway field. Mr. Schmidt has been engaged in public utility work for more than thirty years. He went to Des Moines about five years ago from Springfield, Ill. He has served with the so-called Harris interest for many years. While he has made no definite statements as to his plans after retiring from companies at Des Moines Mr. Schmidt intimated that he would associate himself with his son, who is an engineer.

Capt. George F. Daggett has been appointed chief of the transit bureau of the Public Service Commission for the First District of New York. Captain Daggett succeeds J. P. H. DeWindt, who resigned several months ago to undertake the management of a munitions plant. The chief of the transit bureau is the officer upon whom the Public Service Commission relies to supervise the operations of the several transportation lines in the city, to investigate complaints and to inaugurate improvements in service where needed. Captain Daggett, who has recently returned to the commission after a year in military service, is well qualified for the position, as he is thoroughly familiar with all phases of street surface railroad and subway and elevated operation. He entered the employ of the commission shortly after its organization in 1907, and latterly has filled the posts of chief clerk and assistant secretary.

Col. Alexander R. Piper has been appointed superintendent of employment for the Brooklyn (N. Y.) Rapid Transit Company. Colonel Piper has instructions from Lindley M. Garrison, the receiver of the company, to employ 1500 additional men for work as motormen, conductors, guards and repair yard employees. Early in 1918, Colonel Piper, who was formerly general freight agent of the Brooklyn Rapid Transit Company, was appointed lieutenant-colonel of the Quartermaster's Corps of the National Army and Depot Quartermaster in command of the New York depot, being advanced from the rank of captain with which in April, 1917, he was called back into active army service by the President. He skipped entirely the intermediate rank of major. Colonel Piper was born at Fort Wadsworth, Staten Island, in 1865. He was graduated from West Point and served ten years in the regular army. He retired from active service in June, 1899, and between that time and his re-entry into the national service during the present war he was employed in civilian pursuits. In March, 1904, he was made general superintendent of the American Railway Traffic Company, a subsidiary of the Brooklyn Rapid Transit Company.

Obituary

H. L. Wales, who resigned recently as manager of the lines of the Connecticut Company at Waterbury on account of ill health, is dead.

Thomas D. Milne, formerly trainmaster of the Northwestern Elevated Railroad, Chicago, Ill., died in Boston recently. Mr. Milne went to Boston to accept a position with the Bay State Street Railway. There he contracted influenza and pneumonia, which resulted in his death. Mr. Milne is survived by his widow and four children.

Private Karl A. Schaller died on Jan. 9 from pneumonia at Jackson, Mich. Private Schaller was a former student of the University of Minnesota and finished his education at the Carnegie Institute of Technology, Pittsburgh. At one time he was superintendent of the St. Paul (Minn.) Southern Railway and was special sales agent for the General Electric Company at Jackson. He was thirty-one years old. He is survived by his widow and two children.

R. J. Thompson, junior superintendent of railways of the Toledo Railways & Light Company, Toledo, Ohio, died of pneumonia on Dec. 5. He was regarded as one of the brightest of the "cadet" engineers and had seen considerable service with Henry L. Doherty & Company, who operate the Columbus property. He was graduated from Ohio State University in 1910 with the degree of electrical engineer. His first work in the Doherty organization was as a "cadet" with the Denver Gas & Electric Light Company. Subsequently he was with the Cumberland & Westernport Electric Railway and at the New York office.

Daniel Wilkin McWilliams, prominent railroad man and banker and since 1881 secretary and treasurer of the Manhattan Railway, New York, N. Y., controlled by the Interborough Rapid Transit Company, is dead. Mr. McWilliams was born in Hamptonburg, N. Y., and at the age of eighteen he entered the employ of the New York & Erie Railroad. After devoting five years in the banking business, he was elected secretary and treasurer of the Toledo, Peoria & Warsaw Railroad. From there he went to the banking house of Henry Q. Marquand, becoming a partner in the firm. In 1904 he became treasurer of the Interborough Rapid Transit Company, holding that position for four years.

Harlan P. Cairns, long an employee of the Twin City Rapid Transit Company, Minneapolis, Minn., formerly in the operating department and for the past four years in the claim department, is dead. Mr. Cairns was born in Janesville, Wis., on May 26, 1883. With the exception of being in the railway business for a short time on the Pacific coast, most of his business career was with the Twin City company. Mr. Cairns is survived by his widow and one child. This is the third bereavement in the Cairns family within six months, Mrs. Ralph H. Cairns having died last June and Leonard S. Cairns, general manager of the Eastern Pennsylvania Railways, Pottsville, Pa., brother of Harlan P. Cairns, having died of influenza on Oct. 10.

George R. Sheldon, former treasurer of the National Republican Committee and a member of the brokerage firm of William C. Sheldon & Company, New York, N. Y., died at Carbondale, Ill., on Jan. 14, of injuries received in an accident at a mine there. Mr. Sheldon had long been one of the well-known business men and financiers of New York and his name had been connected with many of the country's largest industrial enterprises. He was born in Brooklyn, on April 16, 1857, and after an early training at the hands of private tutors was sent to St. Paul's School at Concord, N. H. He then entered Harvard from which he was graduated with the degree of A. B. with the class of 1879. Immediately upon leaving college he engaged in the banking business. Gradually he branched out into various enterprises and became closely associated with J. Pierpont Morgan in many of Mr. Morgan's transactions. Mr. Sheldon's business affairs were of wide range. He was treasurer and chairman of the board of the North American Company; chairman of the executive committee and treasurer of the Milwaukee Electric Railway & Light Company; president of the Electric Securities Company, treasurer and director of the Detroit Edison Company, director of the American Locomotive Company, the Bethlehem Steel Corporation, the Union Electric Light Company, St. Louis, the West Kentucky Coal Company, the Wisconsin Edison Company and other companies. He was a delegate to the Republican National Convention of 1900, treasurer of the New York county committee from 1899 to 1903, treasurer of the New York State committee in the campaign of 1906, and of the Republican National Committee from 1908 to 1916.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER,
SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Physical Needs of Electric Railways

Cars and Rolling Stock Need Rehabilitation—Increased Rates Should Provide the Means

In 1907, in a letter to the Governor of Minnesota, the late James J. Hill once gave expression to the estimate that $1,100,000,000 a year in additional capital ought to be put into the steam railroads of the country to enable them to keep pace with the demands of the country for trunk line transportation. No statistics are available as to the amount of capital which would be required to keep the electric railways to their normal development, because it is difficult to tell at the present time what their normal development should be. But even if the question of new construction is disregarded in determining the extent of the expenditures which will have to be made during the next few years by the electric railways, the matter of deferred maintenance is a most pressing one.

For a number of years, even before the outbreak of the war, the inadequacy of the 5-cent fare had compelled many companies to economize in all directions, and during the war, this condition has not only been more severe but it has been difficult for the companies to get many kinds of materials, even when they had the money to pay for what they required.

What this situation may be in some cases was indicated at a hearing recently in a large city by a commission to determine the condition of rolling stock of the company operating there. The regular schedule on this property calls for the use of about a thousand cars, or forty-five less than the number a year ago, and the company has about 1400 cars available for use. According to the testimony presented by the officer in charge of equipment, more than a third of these cars were purchased more than fifteen years ago, and in a recent valuation report received a valuation of from 10 per cent to 40 per cent. An even larger ratio of the electrical equipment received the same valuation, showing its age. Other testimony was presented to the effect that 45 per cent of the track ought to be replaced.

The rehabilitation of the electric railways of the country cannot be postponed indefinitely, and when it is undertaken, worn out equipment of the kind described will have to be replaced. The longer such work is put off the more necessary it becomes. Some of it must be undertaken soon, whether the roads "can afford it" or not. The very extent of the economy which has been forced on the electric roads has compelled the attention of the public and authoriities. No one can plead ignorance now of the economic state of the electric lines. They are recognized now as needing relief because of causes beyond their control, and provision is generally being made through higher rates at least for operating expenses and fixed charges. From this to a more liberal treatment by which some sort of rehabilitation program can be begun is the next step.

Some Nice Business for 1919 Already Indicated

Pneumatic Door and Step Control and Automatic Substation Equipment More Popular

Even when conditions look blackest the electric railways are laying plans for the purchase of new equipment and of materials for extension during the year. Reports received by the ELECTRIC RAILWAY JOURNAL, while they do not indicate that any great number of electric railways are going to make extensive purchases, do show that not all of the roads are afraid to buy equipment.

Prominent in the replies received is the intention of railways to purchase, where they have not already done so, pneumatic door and step control. From seven roads which indicated the number of such equipments that they were going to purchase, a total of 162 is recorded. Many other companies stated their intention of going into this market during the current year.

Another field that should be busy during 1919, if such early reports are to be taken as any indication of later buying, is the railway substation field. The automatic substation appears to be growing more popular.

At the present writing traction companies do not appear anxious to either build new or reconstruct old track. Some work, of course, is contemplated.

Whatever is contemplated being done in this connection so far as the reports show, is for short distances, the largest reported being 4 miles. One company in Ohio expects to regrade and reballast 12 miles of track, and a Canadian company reports its intention of replacing 10,000 ties.

On overhead work there are also some reports of business to be placed during the year. All of these, however, are for Canada. In fact, there seems to be more activity, relatively, in the Canadian field than in the United States.

The Labor Factor in Price Revision

Lines in Which Labor Is a Large Percentage of Cost Are Not Expected to Drop

The downward trend of prices is receiving considerable attention at the present time. It seems to be pretty generally felt by producers that prices in the immediate future will depend largely on the labor factor. Thus if labor represents a very large percentage of the cost of the finished product, the chances for prices coming down are not good. If, on the other hand, raw materials represent the predominant cost, prices will drop as raw materials drop. Dependent again upon the labor cost will be the extent to which the latter class of commodities follow the raw material downward.

Thus wire has followed copper down. The drop has not been the same percentage as the drop in copper. Rather has the same differential been kept between refined copper and copper wire base. Even here some of the wire producers were reluctant to lower prices.

On materials where labor plays a much larger part in the cost, such as motors, generators, transformers, etc., producers have not lowered prices, nor do they seem inclined to do so at the present time.

Current Electrical Market Conditions Good

While Sales Have Fallen Off from War Peak, They Are Not Poor for a January Market

Conditions in the electrical field are by no means so bad as some would have people believe. In fact, now that the excitement of the closing down of war activities is virtually over and people are again settling down, men prominent in the sale of electrical goods are becoming a lot more cheerful.

Business, in electrical lines at least, is not bad. In fact, in many places it is rather good for this time of the year. Generally speaking, the months of December, January and February are not particularly active. Sales begin to open up as a rule in March. These conditions, therefore, must be taken into consideration when speaking of current business.

To be sure, sales have dropped off from what they were prior to the signing of the armistice. Furthermore, it is probably true that sales would have been much larger had war continued. This, however, was a forced demand

and did not represent normal purchases.

With the war over the market again returns to normal purchases and therefore must follow, more or less closely, normal buying customs. Therefore it is reasonable to expect that the current demand for electrical goods will be less than October sales. If the sales, however, were away below those for the same period last year or before the war, there might be some occasion for feeling pessimistic. As a matter of fact, it will probably be found that the January and February sales, particularly those by jobbers, will surpass those for the first two months of 1918 and will be greatly in excess of the sales during pre-war Januaries and Februaries.

Incoming orders to manufacturers are, of course, smaller than they have been, but it is doubtful if they have fallen below what would be good business for this season. Certain it is that the total volume of current sales billed of electrical goods surpassed that of the first two weeks of January, 1914.

Individual incoming orders, it is true, are not large, but this is by comparison with the size of the orders during the war. In the light of normal winter business these orders will probably be seen differently.

More Cars Suggested for Brooklyn

Receiver Recommends that 400 or 500 New Steel Motor Cars Be Provided

The Brooklyn Rapid Transit Company, through Receiver Garrison in his report to the court, recommends that provision be made as soon as possible for 400 or 500 new steel motor cars to cost approximately $20,000 each.

The financial requirements for the immediate future for the three receivership companies, as outlined by the receiver, in addition to cars just mentioned, include for the Brooklyn Rapid Transit Company the purchase of fifty trail cars with appurtenances, as agent for the surface railway companies, at an estimate of $417,000, and under the New York Consolidated Railroad Company the conversion of surface cars for trailer operation, as agent for surface railroad companies, at a cost of $200,000.

Material in Hands of Government

The stock of machinery and engineering materials on hand not in possession of troops as of Dec. 1, 1918, includes a number of items in the electric railway field. Those of particular interest are 166 concrete mixers, 68 road rollers, 942 tons of paint materials, 1030 tons of copper wire, 772 tons of electrical material and the following track material and fastenings: Rails, 42,855 tons; spikes, 3539 tons; bolts, 1875 tons; angle and splice bars, 1908 tons; turnouts and switches, 4374 tons; miscellaneous track material.

Recent Incorporations

Danbury, Conn.—Application has been made by Charles E. Graham, New Haven, one of the bondholders of the Danbury & Bethel Street Railway, to the General Assembly for a charter for street railway lines in Danbury, with the powers and privileges of building, operating and maintaining all the lines that the Danbury & Bethel Street Railway is now authorized to conduct, and with the same powers to manufacture and sell electric current, and also the right to acquire all or a portion of the franchises and property of the Danbury & Bethel Railway and to issue bonds and securities in part payment thereof. This action is understood to be a preliminary step toward the reorganization of the Danbury & Bethel Railway and the taking over of that company by its bondholders for the purpose of restoring the road to proper condition and operating it.

Franchises

New Haven, Conn.—The following petitions have been filed by the Connecticut Company at the office of the secretary of state: To construct and operate a street railway beginning at Occum, in the town of Norwich, along the Norwich and Worcester turnpike, the Versailles road, the Jewett City-Norwich road, Main and North Main Streets in Jewett City and then to the connection with its tracks near Central Village; to extend charter rights in Taftville for the purpose of connecting its tracks through Norwich Avenue from South B to North B Streets; to construct and operate a railway in Hamden from the connection in Dixwell Avenue near Blake's Corner, along Dixwell Avenue to the connection in Whitney Avenue near the town hall. The Connecticut Railway & Lighting Company, a subsidiary of the Connecticut Company, has petitioned for an extension of its charter rights to ratify its action of Aug. 5, in the extension of its tracks from the end of the North Bridgeport line on Trumbull Avenue Road, along Boston Avenue to connect at East Main Street. This extension was carried out on a request from the United States Housing Corporation as a vital necessity to furnish transportation for munition workers, according to the petition.

Kansas City, Mo.—The Kansas City & Leeds Railroad has received a twenty-year franchise from the City Council to construct an electric line from Thirty-first Street and Hardesty Avenue in a southeasterly direction to Leeds. [Nov. 2, '18.]

Fremont, Ohio.—The Lake Shore Electric Railway is preparing to ask the commissioners for a new franchise through Sandusky County. The present grant expires within six years. The county is contemplating paving the Maude pike from Clyde to a point 1 mile west of Fremont and the electric line has offered to contribute toward the cost in exchange for a new franchise or an extension of the present one.

Track and Roadway

Phoenix (Ariz.) Railway.—This company reports that it will construct 1 mile of new track during 1919.

Sacramento Northern Railroad, Sacramento, Cal.—A survey has been begun by engineers of the Sacramento Northern Railroad for a proposed extension through the Sutter Basin. The proposed line will connect with a branch of the Sacramento Northern Railroad to Woodland, about 2½ miles out of Woodland, thence northerly about 6 miles, crossing the Sacramento River at a point about 5 miles below Knights Landing and thence up through the center of reclamation district 1500. The line, if constructed, will ultimately be extended northerly a distance of about 10 miles and connect with the Meridian branch of the Sacramento Northern Railroad. In so doing there will be a completed loop from Sacramento to Woodland, to Meridian and thence back to Sacramento via Marysville.

Trenton & Mercer County Traction Corporation, Trenton, N. J.—The Trenton & Mercer County Traction Corporation is conducting a series of conferences with the City Commission of Trenton for the purpose of speedily bringing about improvement to the system as ordered by the Board of Public Utility Commissioners of New Jersey. Since the company was given permission to charge a straight 6-cent fare, a total of approximately $80,000 has been expended for new work completed and under way and materials and supplies contracted for. The company has arranged for a large expenditure for track improvement at State and Broad Streets, where new switches and cross pieces will be placed.

New York, N. Y.—The Continuous Transit Securities Company, of which M. Everhart Smith is president, has filed with the Public Service Commission for the First District of New York a plan for the establishment of a moving platform in Forty-second Street in place of the present shuttle subway operation between the East and West Side subway lines. It is proposed to utilize two of the four tracks and to construct three moving platforms, the fastest of which will operate at a speed of 9 m.p.h., and its seating capacity be 31,680 passengers per hour. The cost is estimated at less than $1,000,000. The commission has taken the plan under consideration.

Interborough Rapid Transit Company, New York, N. Y.—Operation has been begun by the Interborough Rapid Transit Company on the Pelham Bay Park branch of the Lexington Avenue subway from 138th Street to Hunts Point Avenue.

South Fork-Portage Railway, Johnstown, Pa.—A report from the South Fork-Portage Railway states that during 1919 the company will complete and equip the remaining 3½ miles of its line connecting South Fork and Portage if the Capital Issues Committee approves the issuance of stocks and bonds.

Beaumont (Tex.) Traction Company.—The Beaumont Traction Company plans within the next couple of months to spend $87,000 for double-tracking certain streets, putting in new switches and extending the signal block system in order to better maintain its schedules.

Seattle (Wash.) Municipal Railway.—The City Council of Seattle has adopted a resolution providing for the sale of sufficient bonds to provide finances for the immediate construction of the west end of the municipal elevated railway. City Engineer Dimock believes that the road will be ready for operation of cars by Feb. 1. The government plans to discontinue the steam train service to the shipyards, and the city will make every effort to have the street car line ready by the time the steam service is abandoned.

Power Houses, Shops and Buildings

Western Light & Power Company, Boulder, Col.—It is reported that improvements and extensions will be made by the Western Light & Power Company to its plant and system to cost about $1,000,000.

Kansas City, Mo.—C. C. Peters, president of the Interurban Central Station Company, has announced that Hughes Bryant has been employed to push the project of the construction of the proposed interurban passenger terminal at the corner of Tenth and McGee Streets to be used by all interurban railways entering Kansas City. Architects will be employed during the coming month and the construction contracts let as soon as final plans are drafted.

Cleveland, Alliance & Mahoning Valley Railroad, Ravenna, Ohio.—This company reports that during 1919 it expects to purchase an engine lathe, wheel press, boring mill and three 200-kva. transformers for its substation.

Pacific Northwest Traction Company, Seattle, Wash.—Plans are being made by the Pacific Northwest Traction Company for the immediate erection of a building at Sixth Avenue and Olive Street to be used as a permanent station for the Everett interurban line. The structure will cost about $100,000.

Ashland Light, Power & Railway Company, Ashland, Wis.—It is reported that the Ashland Light, Power & Railway Company plans to begin work on a hydro-electric project on the Flambeau River, 14 miles north of Ladysmith, early in the spring, to cost about $1,750,000. L. E. Myers & Company, engineers, 53 West Jackson Boulevard, Chicago, will supervise the work

Trade Notes

Harry De Steese, 30 Church Street, New York, N. Y., has reopened his office which has been closed during the period of the war. Here he will deal in tapes and compounds, line material, shop and track tools, armature and field coils and other railway supplies. Mr. De Steese has been in the business for twenty-four years.

Frederick A. Scheffler, formerly with the Babcock & Wilcox Company, has become associated with the Fuller Engineering Company of Allentown, Pa., as manager of the department devoted to the application and introduction of pulverized coal equipment for steam power plants in the United States. Mr. Scheffler's headquarters will be 50 Church Street, New York.

W. Jerry Stanton has resigned as sales manager of the Railway Improvement Company to become special representative of the National Railway Appliance Company, 50 East Forty-second Street, New York. Mr. Stanton is a native of Schenectady and for a period covering eighteen years was employed by the General Electric Company in its testing, engineering and sales departments.

Roller-Smith Company, manufacturer of electrical instruments and circuit breakers, New York City, announces the opening of a Detroit office in the New Telegraph Building in charge of C. H. Nicholson, formerly connected with the Chicago office of the company, who just returned from service with the Signal Corps. The company also announces the appointment of James E. Wood as manager of its Cleveland office at 711 Williamson Building, succeeding C. S. Ripley.

W. C. Lincoln has been appointed engineer for the National Railway Appliance Company, 50 East Forty-second Street, New York, effective Jan. 1. Mr. Lincoln was originally employed by the American Locomotive Company, Schenectady, leaving that company's service to enter Union University. After graduation and the completion of the General Electric Company's test course, he was assigned to special railway work by that company. Subsequently, he took up and completed the company's engineering extension course, after which he was connected for some time with the consulting engineering department. Later Mr. Lincoln entered the railway engineering department and in 1913 transferred to the General Electric Company's Philadelphia district as commercial engineer, railway department, after which he entered the service of the Railway Improvement Company, New York, as electrical engineer.

Edwin Besuden, for the past sixteen years sales manager for the Jewett Car Company, Newark, Ohio, which recently went into receivers' hands, has resigned from this company and is now temporarily located at the offices of the Elleon Company, 50 Church St., New York City. Mr. Besuden expects to enter the electric railway supplies field as representative for a number of manufacturers supplying this market, but has made no definite plans yet in this regard.

Edward D. Hillman, for the past twelve years secretary and engineer of the National Railway Appliance Company, New York, has resigned from that company and has accepted a position with the new Consolidated Steel Corporation, 165 Broadway, New York. This company has just been organized and will handle the export trade of the following independent steel mills. Bethlehem Steel Company, Brier Hill Steel Company, Lackawanna Steel Company, Lukens Steel Company, Midvale Steel Ordnance Company, Republic Iron & Steel Company, Sharon Steel Hoop Company, Trumbull Steel Company, Whitaker Glessner Company and Youngstown Sheet & Tube Company.

Economy Electric Devices Company, Chicago, Ill., reports recent sales of Vulcan One-Man Kersosen Torches, for use in thawing frozen tracks and equipment and for shop work including preheating, to the following roads: Rockford & Interurban Railway; Dayton. Springfield & Xenia Southern Railway; Illinois Traction System; Grand Rapids, Grand Haven & Muskegon Railway; Keokuk Electric Company; Joliet & Eastern Traction Company; Fort Wayne & Northern Indiana Traction Company; United Railways & Electric Company; Capital Traction Company; Terre Haute, Indianapolis & Eastern Traction Company; Inter-Urban Railway Company; Chicago Surface Lines; Milwaukee Electric Railway & Light Company; Chicago Elevated Railways; Chicago, North Shore & Milwaukee Railroad; Philadelphia Rapid Transit Company; Atlantic City & Shore Railroad; Dubuque Electric Company and York Railways Company.

Capt. H. Fort Flowers, head Trench Warfare Materials Section of the Ordnance Department, Philadelphia zone, has recently been relieved from the service by the War Department. He has returned to New York to take up his work as president and general manager of the Differential Car Company, which was organized by him four years ago. The Differential Electric Dumping Car invented and designed by Captain Flowers and built under his direction is well known to electric railway track engineers. A large number of these cars are now in service in various parts of the United States. With the personal attention which Captain Flowers will be able now to give to his business interests an active business campaign may be expected. Major Leon Fraser, vice-president of the company, and S. G. Hughes, first lieutenant of field artillery, are still in France in active service. F. E. Scott, secretary of the company and first lieutenant in the gas warfare service, has also been relieved from military duty to take up his work with the company.

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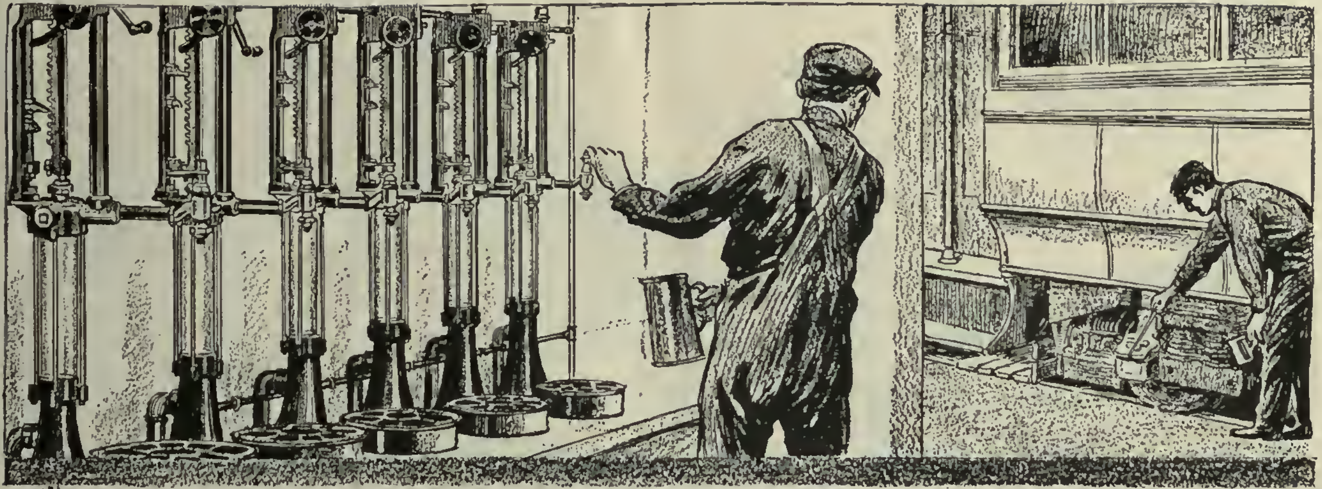

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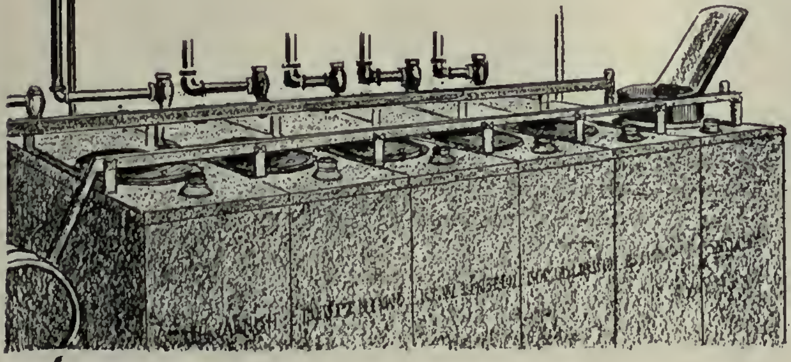

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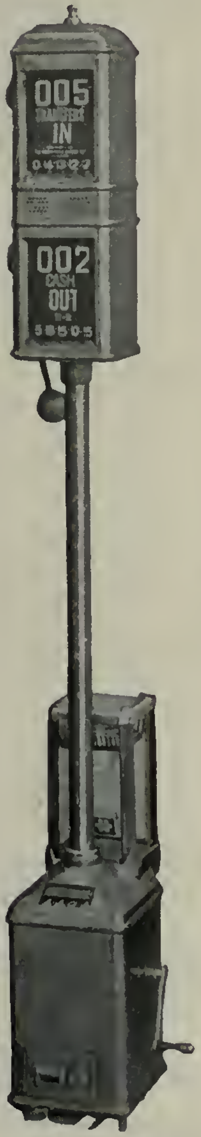

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McGraw Electric Railway List

for February, 1919

Ready February 17

It contains valuable information of the following character:

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AKRON. 140,000 (1917).

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Geo. Sprague, Jr.......14 Wall St.
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Audr. James Sweeney..........Akron
Gen. Supt. Ry. Dept.
Frank I. Hardy............. "
Gen. Supt. Elec. Dept.
L. G. Tighe................ "
Traffic Mgr. Chas. A. Laney..... "
Claim Agt. E. C. Carpenter...... "
Pur. Agt. Russell J. Harter..... "
Engr. Maint. of Way
E. D. Eckroad.............. "
Supt. Shops, K. D. Leavitt..... "
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The correct name and address of every electric railway in the United States, Canada, Mexico and West Indies?

The address of the main office?

The names of affiliated or controlling corporations?

The main points on the route?

The correct names and business addresses of the officers and officials?

The power plant equipment?

The transmission voltage?

The trolley voltage?

The substation equipment?

The location of the power stations and repair shops.

The parks reached and whether controlled or leased?

The mileage of the road?

The number and kind of rolling stock owned?

The gage of track?

Whether the Company also does a lighting and power business?

*Whether a change in the Company has been made since the last edition was published?

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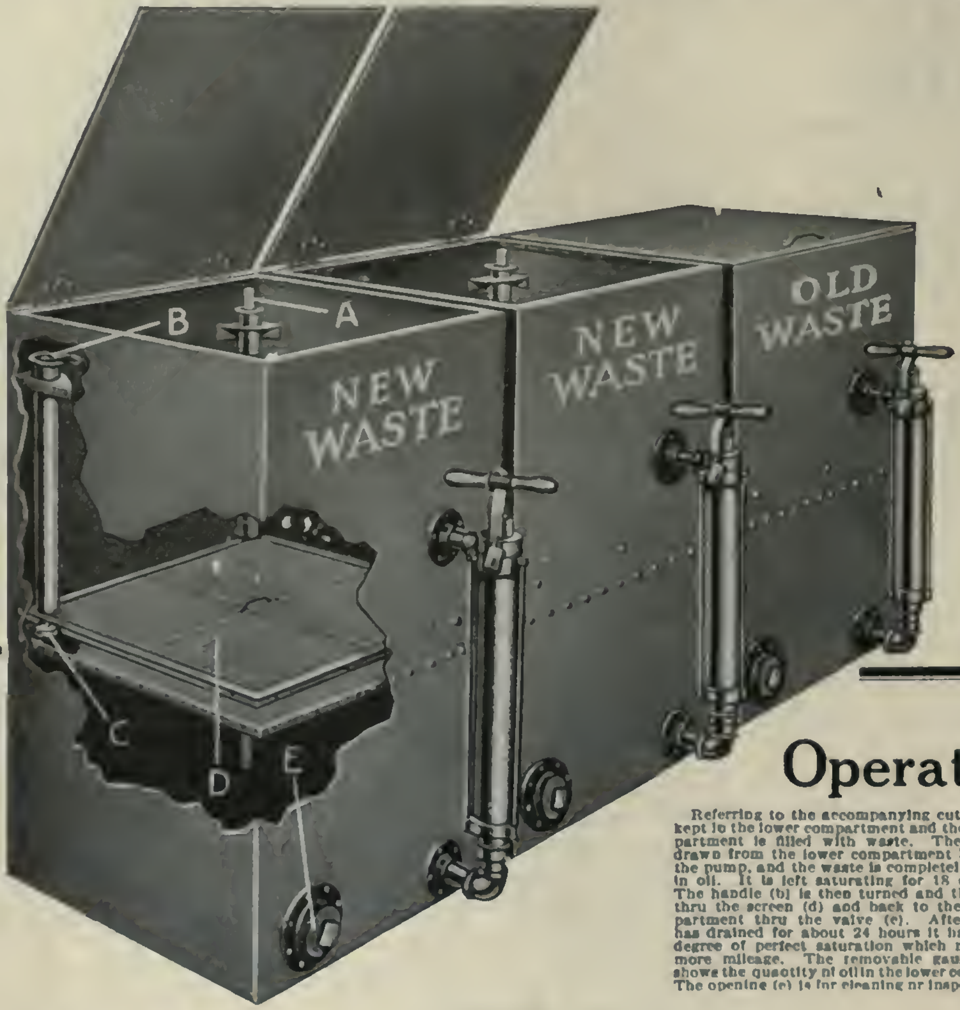
HK WALKOVER COPYRIGHTED

Greatly Increased Mileage from each Journal Box Packing



Operation

Referring to the accompanying cut. The oil is kept in the lower compartment and the upper compartment is filled with waste. The oil is then drawn from the lower compartment by means of the pump, and the waste is completely submerged in oil. It is left saturating for 18 or 24 hours. The handle (b) is then turned and the oil drains thru the screen (d) and back to the lower compartment thru the valve (e). After the waste has drained for about 24 hours it has reached a degree of perfect saturation which means 100% more mileage. The removable gauge stick (a) shows the quantity of oil in the lower compartment The opening (e) is for cleaning or inspection.

By using the Milwaukee Waste Saturation System

you can avoid the troublesome and costly hot box and realize 10 to 15 thousand miles on a single journal box packing, at a substantial saving of oil.

Constant lubrication is assured by the method of saturating the waste. Thorough lubrication makes possible a saving of at least one-third on journal box maintenance.

Milwaukee Outfits Cut Your Oil and Labor Expense

We manufacture 30 different types of outfits for the economical storage and handling of such liquids as machine oils, cutting oils, kerosene, gasoline, etc. A Milwaukee Outfit will save you from 8 to 10 gallons of liquid on every barrel you use.

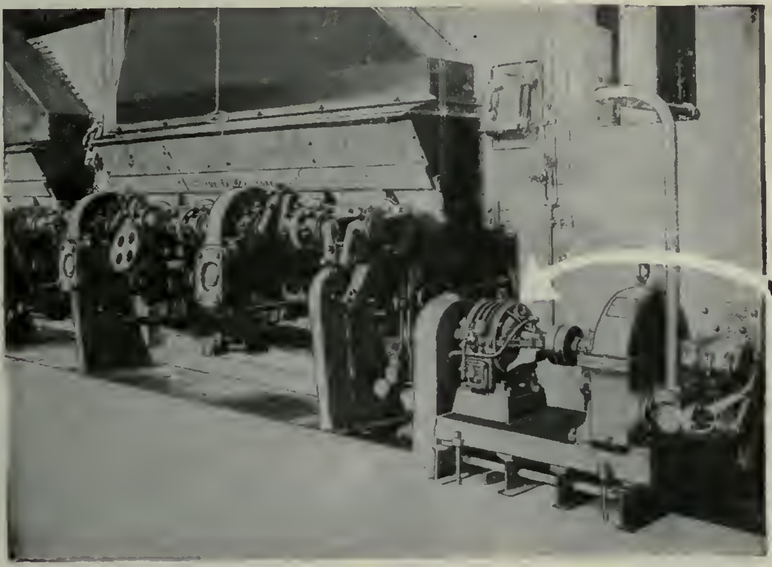
Write for our catalog of complete oil storage systems for Railways.

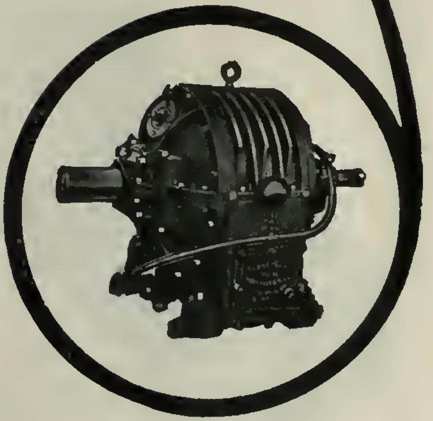
Milwaukee Tank Works

Milwaukee, Wisconsin

A TURBOGEAR Stoker Drive

FAST PATENTS





IN a leading central station in New England the Taylor Stokers which feed the roaring fires day and night are driven through 25-hp. Turbo-Gears by Terry Steam Turbines.

The Turbines run at 3500 r.p.m. and the Stokers at 500 r.p.m. The actual loss of power in making this 7 to 1 reduction is less than 2%—the lowest power loss for *any* form of transmission.

The choice of Turbo-Gear insures positive operation and absolute reliability for the stoker drive in this plant. These are factors of the utmost importance.

Turbo-Gear steps speed up with the same facility. What is your problem?

Write for Bulletin 204 today.

The Poole Engineering & Machine Company

Manufacturers of Gears and Power Transmission Machinery Since 1843

Baltimore, Maryland, U. S. A.

CHARLOTTE, N. C.............Realty Bldg.
CHICAGO.................Old Colony Bldg.
DALLAS......1405 Southwestern Life Bldg.
DENVER.........First National Bank Bldg.
DETROIT............423 Dime Bank Bldg.
EL PASO..................615 Mills Bldg.
MILWAUKEE......................Wells Bldg.
NEW YORK...................50 Church St.
PHILADELPHIA..........929 Chestnut St.
PITTSBURGH.......781 Union Arcade Bldg.
ST. LOUIS....................2211 Olive St.
SALT LAKE CITY..........218 Judge Bldg.
SAN FRANCISCO..........503 Mission St.
SEATTLE ....2012 L. C. Smith Bldg.

TURBOGEAR

FAST PATENTS

SERVICE

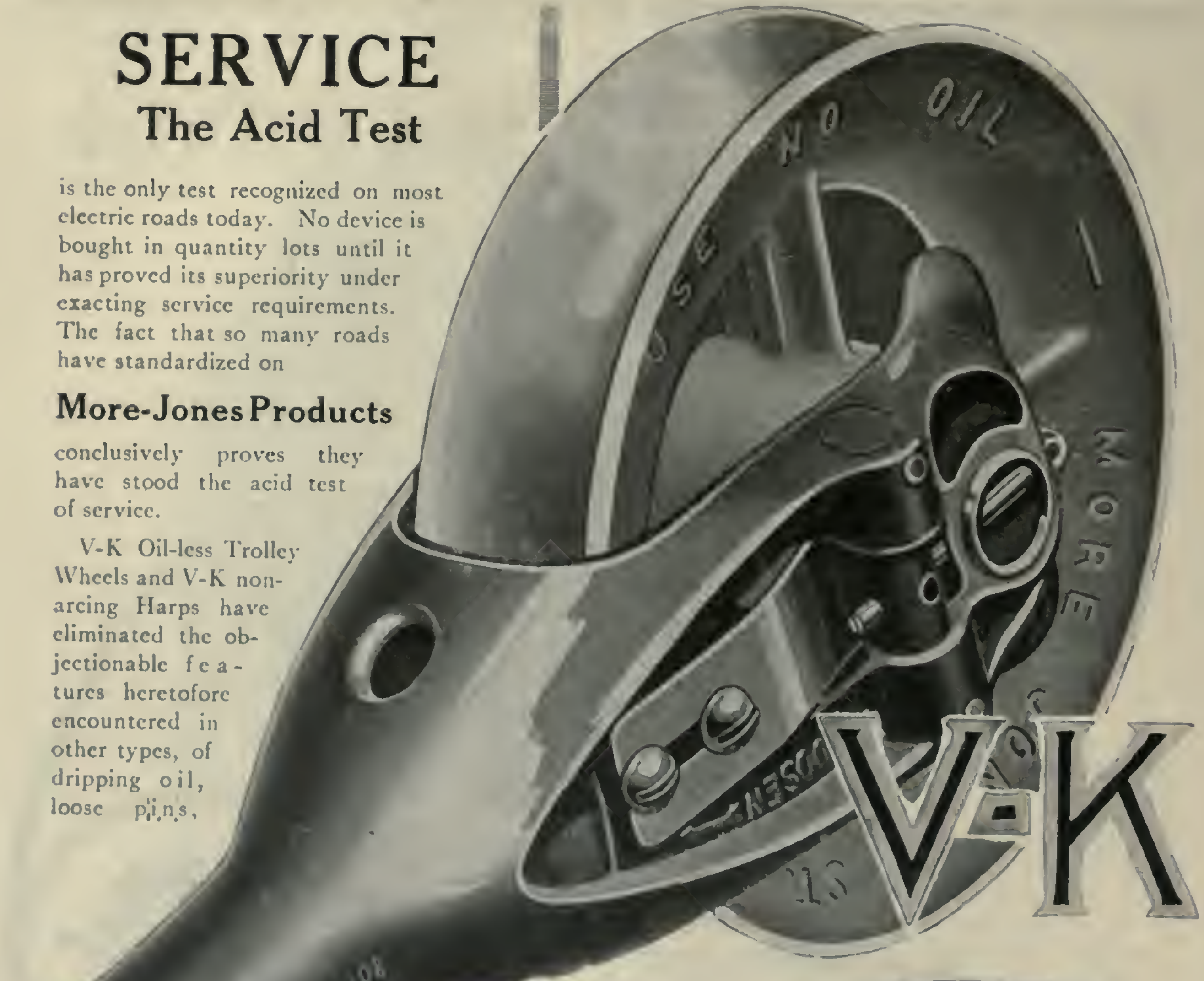
The Acid Test

is the only test recognized on most electric roads today. No device is bought in quantity lots until it has proved its superiority under exacting service requirements. The fact that so many roads have standardized on

More-Jones Products

conclusively proves they have stood the acid test of service.

V-K Oil-less Trolley Wheels and V-K non-arcing Harps have eliminated the objectionable features heretofore encountered in other types, of dripping oil, loose pins, poor contact and consequent short life of both harps and wheels. The V-K combination of harp and wheel insures maximum service at minimum cost.



More-Jones' Tiger Bronze is the ideal alloy for Axle and Armature Bearings, possessing the very best anti-frictional qualities and maximum strength, insuring exceptional long life and service.

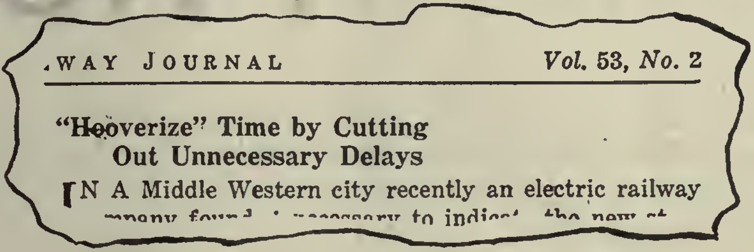
More-Jones' Armature Babbitt Metal is made especially to meet the most severe Armature Bearing conditions; high fusing point; negligible loss in re-melting; can be used over and over, because it retains its physical properties.

More-Jones Brass & Metal Co.
St. Louis, Mo.

MORE-JONES
"TIGER"
BRONZE
AXLE
BEARINGS

BABBITT METAL

Are You Hooverizing Time?

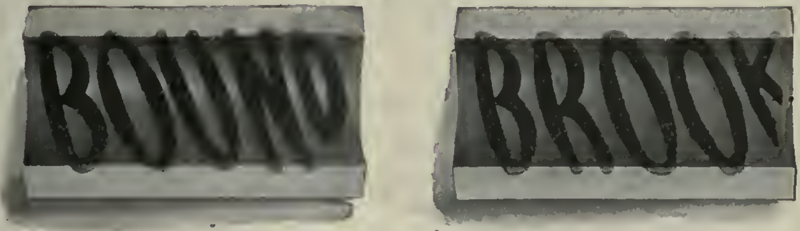


WAY JOURNAL *Vol.* 53, *No.* 2

"Hooverize" Time by Cutting Out Unnecessary Delays

IN A Middle Western city recently an electric railway

You can save Time, Labor, Power and Oil by using



Trademark Reg. U. S. Pat. Office

OIL-LESS

Trolley Wheel Bushings

There is a timely message in the title of the above editorial from a recent issue of this Journal—and one answer is found in Bound Brook Bushings.

If you are using plain bushings on your trolley wheels you are lubricating them—using man power several times a week. It takes time to do that.

But this attention is not needed if your trolley wheels are bushed with Bound Brook Oil-less Bushings. These bushings contain lubricant in themselves sufficient to outlast the trolley wheel.

Oiling cannot harm them, but they will run as efficiently under neglect as the most carefully lubricated bushing in your barns.

Save time—save man power—insure perfect running, long wearing trolley wheels.

Bound Brook Oil-less Bearing Co.
Bound Brook, N. J.

Canadian Distributors—Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg

NOW! NOW! NOW!

Now is the time to sell machinery and material to the industries curtailed during war time. Equipment offered *now,* gets the benefit of present market prices and *immediate* demands.

You can reach the big buyers in the electric railway field through

The Searchlight Section of Electric Railway Journal

"Searchlight" advertising is the big factor of recent years in the sale and exchange of used machinery. Buyers and sellers use it to equally good advantage:

During war times it helped both government departments and private buyers to obtain necessary equipment; it enabled one advertiser to sell $4,800 worth of machinery through advertising that cost $12; another sold equipment for double the price he expected to get for it; another sold equipment through "Searchlight" advertising in less than a month, that has already been offered through other channels for over 8 months.

If YOU have surplus equipment on hand, NOW is the time to sell it—through the "Searchlight."

SEARCHLIGHT
SERVICE
SECURES
SATISFACTORY
SALES

COLUMBIA MACHINE WORKS AND MALLEABLE IRON CO.
Atlantic Ave. and Chestnut St.
Brooklyn, N. Y.

CINCINNATI CAR CO.
Cincinnati, Ohio

W. R. KERSCHNER CO., Inc.

KEYES PRODUCTS CO.
120 Broadway, New York

C. I. EARLL
York, Pa.

ALBANY CAR WHEEL CO.
Albany, N. Y.

Centralize Your Buying

We represent the above companies as eastern sales agents.
We sell the following equipment for electric railways:—

- Axles
- Cars, Passenger, Freight and Express
- Cleaners and Scrapers, Track
- Couplers, Car
- Fenders and Wheel Guards
- Gates, Car
- Registers and Fittings
- Trucks
- Ventilators, Car
- Ceiling, Car
- Headlining
- Roofing, Car
- Catchers and Retrievers, Trolley
- Wheels, Car
- Armature Shaft and Axle Straighteners
- Armature Buggies and Stands
- Babbitting Molds
- Banding and Heading Machines
- Car Hoists
- Car Replacers
- Coil Taping Machines
- Coil Winding Machines
- Pinion Pullers
- Pit Jacks
- Signal or Target Switches
- Tension Stands
- Armature and Axle Bearings
- Armature and Field Coils
- Bearings (Axle and Armature)
- Brush-holders and Brush-holder Springs
- Brake, Door and other Handles
- Brake Forgings, Riggings, etc.
- Car Trimmings
- Commutators
- Controller Handles
- Forgings of all kinds
- Gear Cases (Steel and Malleable Iron)
- Grid Resistors
- Third-rail Shoe Beams and Accessories
- Trolley Poles (steel) and wheels

When you are in the market for any of the above equipment or material send us your inquiries. We will personally attend to your requirements. In other words, besides the goods we give you service worth buying. Centralize your buying.

W. R. Kerschner Co., Inc.
50 Church Street, New York

These Columbia Tools

can turn out Bearings for you at once

YOU will understand the perfection of Columbia-made products when we tell you that we have several hundred machine tools alone.

Practically each tool, be it drill, shaper, borer, grinder, planer or lathe, is handled by the same man day in, day out.

Such specification inevitably results in turning out the best possible work.

That's only one of the many reasons for using Columbia-made products.

Columbia Machine Works & Malleable Iron Co.

Atlantic Ave. and Chestnut St.
Brooklyn, N. Y.

W. R. Kerschner Co., Inc., N. Y.
Holden & White, Inc., Chicago
F. F. Bodler, San Francisco
Railway & Power Eng. Co., Ltd., Toronto, Ont.

TOOLS

Armature and Axle Straighteners
Armature shaft straighteners
Armature buggies and stands
Babbitting molds
Banding and heading machines
Car-hoists
Car replacers
Coil Taping machines for armature leads
Coil winding machines
Pinion pullers
Pit jacks
Signal or target switches
Tension stands

CAR EQUIPMENT

Armature and axle bearings
Armature and field coils
Bearings (axle and armature)
Brush-holders and brush-holder springs
Brake, door and other handles
Brake forgings, riggings, etc.
Car trimmings
Commutators
Controller handles
Forgings of all kinds
Gear cases (steel or malleable iron)
Grid resistors
Third-rail shoe beams and accessories
Trolley poles (steel) and wheels

BOYERIZED BUSHINGS
are the Regular Thing
at Charleston, S. C.

With car-shop labor obliged to double up as trainmen, there is no excuse for failing to keep the brake-rigging out of trouble.

That seems to be the idea at Charlestown, S. C., where Boyerized Bushings are used where-ever they can help to keep the car on the line and keep it safe.

A recent order for 400 more Boyerized Bushings carries a suggestion to you.

We keep thousands of bushings on hand for immediate delivery. Just name size and quantity.

ELECTRIC RAILWAY SUPPLIES
Bemis Car Truck Company
SPRINGFIELD MASS

Bemis Trucks
Case Hardened Brake Pins
Case Hardened Bushings
Case Hardened Nuts and Bolts

Manganese Brake Heads
Manganese Transom Plates
Manganese Body Bushings
Bronze Axle Bearings

Cincinnati
"Tool Steel"
Gears and Pinions
have proven their
superiority
over every grade on
the market. Ask us
for our "evidence."

The Tool Steel Gear & Pinion Co.
Cincinnati O.

The Standard of Safety and Economy

RIMCO

Rubber Insulated Pliers Tested to 10,000 Volts

Cheapest in the long run because they never wear out. Soft—non-detachable—and unbreakable insulation tested to 10,000 volts.

Rubber Insulated Metals Corp., Plainfield, N. J.

SALES AGENTS: Electric Service Supplies Co., 17th and Cambria Sts., Philadelphia. Canadian Agent: Lyman Tube & Supply Co., Ltd., Montreal, Toronto and Winnipeg.

Exclusive Export Agents
International
Western Electric Company
INCORPORATED

Here's the Point

where you want the Material Dumped. Not half of it over the track.

THE DIFFERENTIAL
Electric Dumping Car

places its contents well away from the track, leaving a clear road for operation. Cars are built entirely of steel, and a small individual motor for each car enables an entire trainload to be dumped safely by a single unskilled laborer.

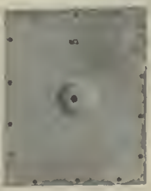
The body is very low and light and can be loaded while in tilted position, permitting easy shoveling and much saving in labor.

Invest in the proper number of Differential Electric Dumping Cars to meet your conditions—and watch your construction expenses dwindle.

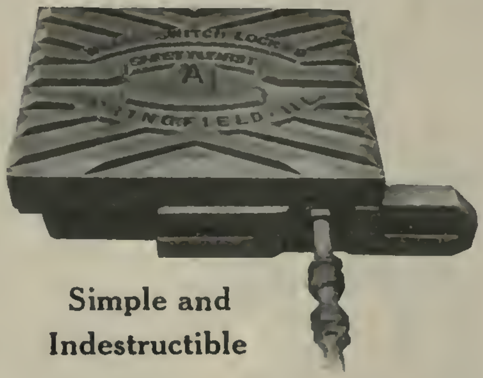
Write for Bulletin No. D3, and be convinced

DIFFERENTIAL CAR CO., INC., 141 Broadway, NEW YORK

WEISS SWITCH LOCK



Ends All Switch Troubles



Here is a positive railway switch point lock that locks both right and left, locking the switch so tightly that there is no chance of splitting it. Once installed it absolutely ends all switch troubles, for it is *waterproof, non-freezable, mudproof and sandproof.* It never requires attention, it is safe, dependable and practically indestructible.

Watertight
Non-Freezable
Mud-Proof
Sand-Proof

Simple and Indestructible

This switch lock is exceedingly simple in design, having very few parts, none of which are complicated. The box is absolutely tight, to prevent loss of oil, with which it is filled. It has a stuffing box where the connecting rod passes through, to prevent the entrance of water or dirt.

The heaviest traffic will not interfere with or damage the Weiss Switch Lock.

You can install one on approval, for 30 days' trial, but be sure to give measurements from top of rail to center of bolt holes.

WEISS SWITCH LOCK CO., 600 E. Capitol Ave., Springfield, Ill.

TRAM THE FIRST SHOT

Ninety per cent. of Car Replacements fail on first trial because the wheel flange shifts the replacer and lets the tread of the wheel drop below the head of the rail. By using this clamp which grips the replacer against the rail the wheel will tram the first shot.

Manufactured and Sold by

The Reading Specialties Company

Reading, Pa.

NILES-BEMENT-POND CO.

GENERAL OFFICES, 111 BROADWAY, NEW YORK

MACHINE TOOLS

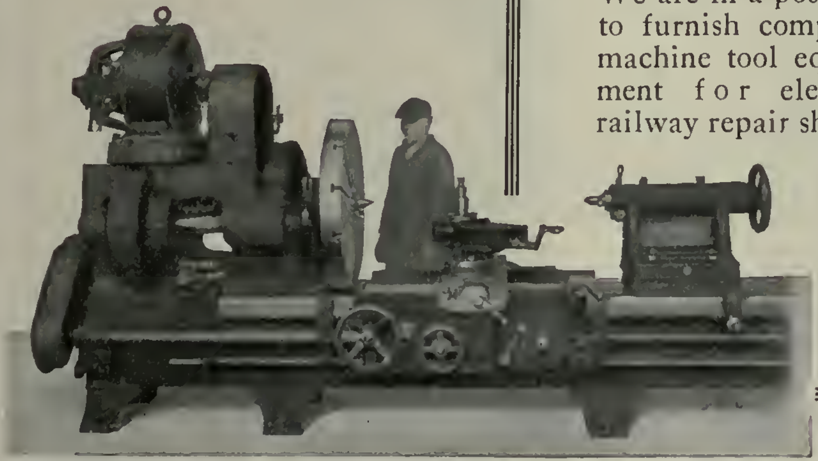
For Electric Railway Repair Shops

We are in a position to furnish complete machine tool equipment for electric railway repair shops, as well as steam hammers and electric traveling cranes.

Correspondence Invited.

OUR LINE INCLUDES

Axle Lathes
Planers
Car Wheel Borers
Drills
Hydraulic Wheel Presses
Slotters
Shapers
Bolt Cutters
Milling Machines, etc.



The Fuses Are Easily Renewed

But only by authorized persons, on

Krantz

Safety Panel Boards

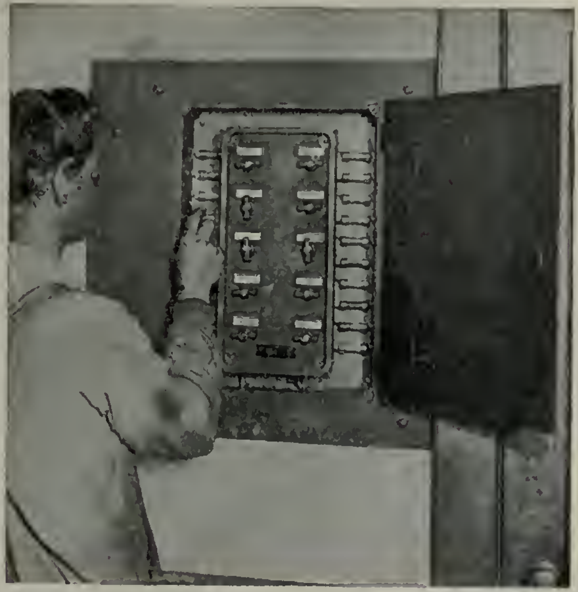
WESTINGHOUSE ELECTRIC

The door is in two parts. The inner door gives access to the switches only, where every reachable part is dead. The lights can, therefore, be turned on and off in perfect safety.

The outer door, which covers the fuses, can be locked so that only the electrician can open it. Quick shipment from stock.

Send for Catalogue I-B, giving complete description and prices.

Westinghouse Electric
& Mfg. Co.
East Pittsburgh, Pa.



Star Prices Guaranteed

Every purchaser of Star Lathes during the year 1919 is guaranteed against any decline in present prices.

Should lower manufacturing costs, or any other cause, warrant a reduction in the prices of Star Lathes during the year 1919 rebates covering this reduction will be given the purchaser. A certificate to this effect accompanies each purchase.

Star Lathes have been made for the past 35 years by a concern known for its reliability, excellent manufacturing methods and superior products. Thousands of machine shops, factories and garages, as well as Government plants, operate Star Lathes for high quality work and low operating cost. These lathes perform the work of heavier and more expensive machinery and give excellent satisfaction.

Don't put off ordering that Star Lathe another day. We protect you against any price decline.

Star Lathes are made in 9-in., 11-in., 12-in., and 13-in. swing sizes. A full line of attachments available.

The Seneca Falls Mfg. Co., Inc.
385 Fall Street
Seneca Falls, N. Y.

Williams' Superior Drop-Forged Wrenches For Every Purpose

FOR nearly half a century we have been designing and developing standard lines of drop-forged wrenches to meet every recognized trade need.

We make and carry them, Little and Big, Straight and Bent, Thin and Thick; 40 patterns, in about 1000 sizes, with openings from 3/16 to 7 5/8 inches:—

Something *Standard* for all requirements that can be standardized:—

Something that is *Superior* because our methods and processes from material buying on up to the completed tool enable us to incorporate in our wrenches the experience gained in quantity production of goods of the highest grade for many purposes.

Ask for Descriptive Booklet.

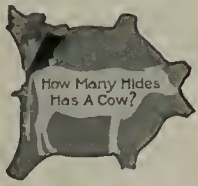
J.H. WILLIAMS & CO.
THE WRENCH PEOPLE
143 [illegible] BROOKLYN, N.Y. CITY

Western Office and Warehouse:
143 So. Clinton St., Chicago

DU PONT FABRIKOID
REG U S PAT OFF

The Perfect Upholstery For Dining Cars

Because it combines rare beauty and great durability with unexcelled sanitary and cleanable qualities.


How Many Hides Has A Cow?

Du Pont Fabrikoid Company
Wilmington, Delaware **New Toronto, Canada**
WENDELL & MAC DUFFIE CO.,
Railroad Department Representative, 61 Broadway, New York

Operating Cars Without Gear Cases is Expensive

and unnecessary if you will order your requirements before your stock is exhausted.

Make due allowance for prevailing conditions affecting manufacture and delivery.

We have sufficient stock of raw materials to take care of orders booked, as well as your requirements for three months commencing shipment 8 to 10 weeks from receipt of order.

THAYER & COMPANY, Inc.
111 BROADWAY, NEW YORK CITY

Why the cartridge must be strong

WHEN a fuse blows enormous gas pressure is built up within the cartridge. In the Noark Renewable Fuse ample venting allows this gas and heat to escape quickly. Nevertheless, there is a certain amount of pressure and shock that takes place each time the fuse blows.

In designing Noark Renewable Fuses even this contingency was looked upon as a problem to be solved. A cartridge was developed strong enough to give maximum service by withstanding shock after shock without damage.

This is only one of the many mechanical features which heretofore seriously affected the life of renewable fuses and which has been overcome in "Noark."

We are confident this out-of-the-ordinary line of renewable fuses will interest you. Why not ask our nearest branch house to show you samples?

JOHNS-MANVILLE SERVICE
COVERS THE CONTINENT

H. W. JOHNS-MANVILLE CO.
New York City
10 Factories—Branches in 63 Large Cities

NOARK
RENEWABLE FUSES

TRADE MARK
Reg. U. S. Pat. Off.

Is Your Road Equipped for Winter?

You ought to make preparations *now* for heavier traffic, sleet storms, and other winter difficulties, by making your line trouble-proof with

ANDERSON SPECIALTIES

Merit first is the policy which gained and maintained **Anderson leadership** in Line Equipment.

Lindall Brush Holders eliminate "brush chatter," and prolong the life of the commutators. Perfect contact is secured under all conditions.

Anderson Specialties include: Aetna insulation, harps, bases, trolley wheels, sanding equipment, frogs, ears, splicers, sleet cutters, sleet wheels, etc.

Let us know your winter equipment needs. Ask for the Catalog when you write.

Albert & J. M. Anderson Mfg. Co.
Established 1877
289-293 A St., Boston, Mass.

Branches—New York, 135 B'way. Philadelphia, 420 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St. London, 48 Milton Street.

Steel for Service

Sensible Gears

In these times of high operating costs, reason requires that those articles be purchased for specified uses which will give the longest possible service with minimum attention beyond that reasonable care which all mechanism should have to insure most perfect and continuous operation. It is possible by careful selection for the user of power transmitted by gearing, even in these present times, to reduce the cost of maintenance to an absolute minimum.

The best gears are heat treated. The effect of careful heat treatment is to refine the structure and to give it that great strength and toughness which, owing to fine grain of the metal, increases its resistance to wear.

To secure the best results, the material on which the heat treatment is performed should itself be of the best.

Carnegie Rolled Steel Gear Blanks

are made of selected steel discs manufactured with the care and skill for which the Carnegie Steel Company is justly noted.

The best gears, therefore, are made from Carnegie Rolled Steel Blanks, and to insure the utmost economy in expenditure it is wise for users of large size gears to specify that they be cut from these blanks.

Carnegie Steel Company
General Offices: Pittsburgh, Pa.

936

You are assured

Minimum Cost

Maximum Mileage

F. C. S. WHEELS

For Street and Interurban Railways

GRIFFIN WHEEL COMPANY

Chicago Detroit Denver Boston St. Paul Tacoma Los Angeles Kansas City

Main Office: McCormick Building, Chicago, Ill.

"STANDARD"

Steel Tires Steel Tired Wheels
Solid Rolled Steel Wheels
O. H. Steel and Malleable Iron Castings
Solid Forged Gear Blanks
Steel Forgings Iron Forgings
Forged and Rolled Steel
Pipe Flanges
Ring Dies Rings Roll Shells
Steel Springs

S BRAND *"The 'Standard' Brand on your material is an assurance of eventual economy."* S BRAND

STANDARD STEEL WORKS CO.

GENERAL OFFICES:
MORRIS BUILDING, PHILADELPHIA, PA.

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ST. LOUIS
HAVANA, CUBA
RICHMOND
SAN FRANCISCO
NEW YORK
MONTEREY, MEX.
MEXICO CITY
LONDON, ENGLAND
PARIS, FRANCE

"The Quality Shops"
CARS SLCo TRUCKS

A Fixed Policy

The St. Louis Policy is as fixed as the stars—it never fluctuates.

Throughout the railway world, *St. Louis* built *Cars* are known for their long life and day in and day out service.

St. Louis Cars are designed in accordance with modern practice—they are always a few steps in advance of the field.

St. Louis Cars are a *quality* product first, last and all the time.

Let us cooperate in the solution of your car problems.

St. Louis Car Company
St. Louis, Mo.

BRAKE SHOE STANDARDS

SAVE MATERIAL
SAVE LABOR
SAVE TIME
SAVE MONEY

Ask Us?

American Brake Shoe & Foundry Co.
30 Church Street, New York
McCormick Bldg., Chicago **Chattanooga, Tenn.**

Don't Take Chances!

The Name "Mathias Klein & Sons" on Safety Straps and Belts means that they are SAFE!

(Look for the name)

We can make IMMEDIATE SHIPMENT of leather goods — belts, safety straps, climber straps, tool bags, etc.

The name, Mathias Klein & Sons, coupled to leather goods for linemen and electricians means the same assurance of quality and trustworthiness as it does in connection with tools.

Don't Forget—Our Complete Illustrated Catalog Awaits Your Request.

Mathias Klein & Sons, Tool Mfrs.

Canal Station 25, Chicago

Steel Poles For Every Pole Purpose

Cut shows Bates Steel Poles in Electric Trolley Line service by Des Moines City Ry. Co., Des Moines, Iowa. Over 2100 Bates Poles in use in Des Moines, mostly Trolley Service and some Street and Park lighting.

Bates Steel Poles are becoming universally popular.

Repeat orders testify their general suitability for every Pole purpose, Telegraph, Telephone, Power Transmission, Electric Trolley Lines, Electric Lighting, etc. Highest class and most up-to-date steel pole equipment in the world. Our STEEL POLE TREATISE tells the story. Ask for it.

About 2,000 tons of steel constantly on hand: immediate shipments and lowest prices.

"Tubular Steel Poles cost 50 per cent. more than Bates Steel Poles, yet Bates Poles are 100 per cent. stronger — will last 100 per cent longer, cover a much broader range of adaptability and are much more artistic than Tubular Poles: ask us to verify these facts.

Bates
Expanded Steel
Truss Co.
208 S. La Salle St.
Chicago, Ill.
U. S. A.

TRUCK WITH TOWER IN RUNNING POSITION

This 3-Section

TRENTON TOWER

is not only more convenient, but stronger than the older type.

The top section is reinforced by the intermediate section. The 3-section design makes it possible to raise the platform 16 inches higher and drop it 12 inches lower than can be done with the old-style 2-section tower.

We'll gladly send you details.

J. R. McCARDELL CO.

Trenton, New Jersey, U. S. A.

Aluminum Company
of America

Manufacturers of

ALUMINUM

Electrical Conductors

All-Aluminum and Steel Reinforced

for

Transmission Lines
Railway and Industrial Feeders
Signal Circuits
Railway Catenary Construction
Bus Bars

also

Ingots—Rods—Rivets—Extended Shapes
Sheet Tubing

also

Aluminum Solders and Flux
Flux and Wire for Autogenous Welding

GENERAL SALES OFFICE
Oliver Bldg., Pittsburgh, Pa., U. S. A.

Canada: Northern Aluminum Co., Ltd., Toronto.
Latin America: Aluminum Co. of South America, Pittsburgh, Pa.
England: Northern Aluminium Co., Ltd., London.

MARSH & McLENNAN FIRE INSURANCE
Special Attention Given to Traction Insurance
Insurance Exchange, CHICAGO
19 Cedar St. NEW YORK
1615 California St. DENVER
314 Superior St. DULUTH
300 Nicollet Ave. MINNEAPOLIS
Ford Bldg. DETROIT
17 St. John St. MONTREAL
23 Leadenhall LONDON
THESE OFFICES WILL GIVE YOU THE BEST THERE IS IN INSURANCE SERVICE

1870-EUGENE F. PHILLIPS. AMERICAN ELECTRICAL WORKS-1882.
WEATHERPROOF WIRE AND CABLE
PAPER INSULATED UNDERGROUND CABLE
(Single, Duplex and Three Phase)
TROLLEY WIRE
(Round, Grooved or Figure 8)
BARE COPPER WIRES AND CABLES
MAGNET WIRE
(Cotton or Asbestos)
Americanite Rubber Covered Wire
Incandescent Lamp Cord
Galvanized Iron and Steel Wire and Strand
AMERICAN ELECTRICAL WORKS
Phillipsdale, R. I.
Boston, 176 Federal; Chicago, 112 W. Adams; Cincinnati, Traction Bldg.; New York, 233 B'way; San Francisco, 612 Howard; Seattle, 100 1st Ave. So.

For Your Service
we have spent a third of a century in perfecting
STANDARD Electric Wires and Cables
of all kinds and all sizes, also Cable Accessories. *Write for our prices before buying.*
Standard Underground Cable Co.
Pittsburgh, Pa.
New York, Philadelphia, Chicago, Boston, San Francisco, St. Louis.

Michigan Western
CEDAR POLES
POSTS, TIES AND PILING
BUTT TREATING
The Valentine-Clark Co.
General Office: Minneapolis, Minn.
Toledo, Ohio; Chicago, Ill.; Kansas City, Mo.; St. Maries, Idaho.

THE LINDSLEY BROTHERS CO.
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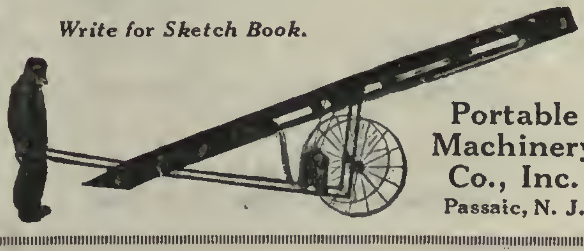

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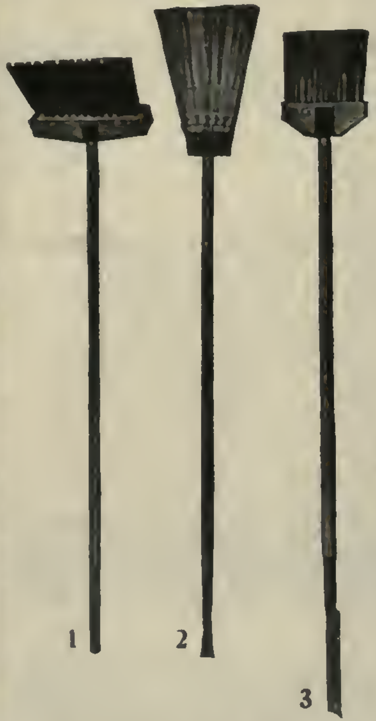

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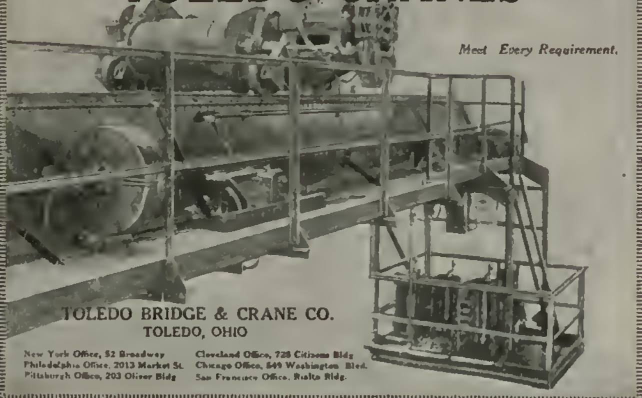

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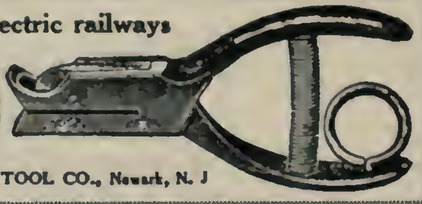

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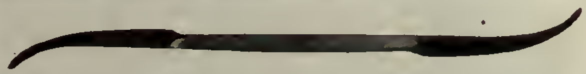

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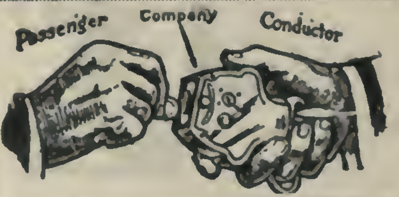

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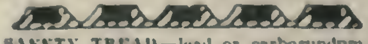

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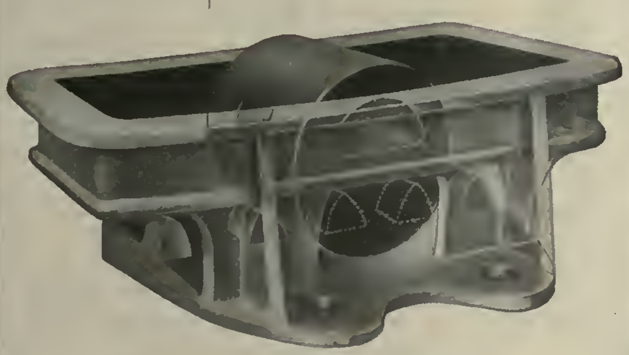

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Get your Wants into the Searchlight

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Acetylene Service & Apparatus
Oxweld Acetylene Co.

Advertising, Street Car
Collier, Inc., Barron G.

Air Rectifiers
Holden & White, Inc.

Anchors, Guy
Electric Service Supplies Co.
Holden & White, Inc.
Johns-Manville Co., H. W.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Automobiles and Buses
Brill Co., The J. G.

Axle Straighteners
Columbia M. W. & M. I. Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
National Railway Appliance Co.
St. Louis Car Co.
Standard Steel Works Co.
Westinghouse Elec. & M. Co.

Babbitting Devices
Columbia M. W. & M. I. Co.

Badges and Buttons
Electric Service Supplies Co.
International Register Co., The

Batteries, Dry
Johns-Manville Co., H. W.
Nichols-Lintern Co.

Batteries, Storage
Electric Storage Battery Co.

Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Kerschner Co., Inc., W. R.
More-Jones Brass & Metal Co.
St. Louis Car Co.
Westinghouse Elec. & M. Co.

Bearings, Center and Roller Side
Holden & White, Inc.
Stucki Co., A.

Bearings, Oilless, Graphite, Bronze & Wood
Bound Brook Oil-less Bearing Co.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail
Niles-Bement-Pond Co.
Reading Specialties Co.
Zelnicker, Walter A., Supply Co., Inc.

Boilers
Babcock &Wilcox Co.

Boiler Cleaning Compounds
Johns-Manville Co., H. W.

Boiler Coverings
Johns-Manville Co., H. W.

Boiler Tubes
National Tube Co.

Bond Testers
American Steel & Wire Co.
Lincoln Bonding Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Service Supplies Co.
Imperial Brass Mfg. Co.
Lincoln Bonding Co.
Ohio Brass Co.
Oxweld Acetylene Co.

Bonds, Rail
American Steel & Wire Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Lincoln Bonding Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Book Publishers
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel
Niles-Bement-Pond Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
Bates Expanded Steel Truss Co.
Electric Railway Equipment Co.
Hubbard & Co.
Lindsley Bros. Co.
Ohio Brass Co.

Brake Adjusters
Holden & White, Inc.
Smith-Ward Brake Co.
Westinghouse Traction Brake Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Holden & White, Inc.
National Brake Co.
St. Louis Car Co.
Safety Car Devices Co.
Westinghouse Trac. B. Co.

Brooms, Track, Steel or Rattan
Paxson Co., J. W.
Zelnicker, Walter A., Supply Co., Inc.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Morgan Crucible Co.
United States Graphite Co.
Westinghouse Elec. & M. Co.

Brushes, Graphite
United States Graphite Co.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.

Bumping Posts
Mechanical Mfg. Co.

Bushings, Case Hardened & Manganese
Bemis Car Truck Co.

Bushings, Graphite & Wooden
Bound Brook Oil-less Bearing Co.

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.)

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc.—See those headings.)

Car Trimmings. (For Curtains, Registers, Doors, Seats, etc.—See those headings.)

Car Panel Safety Switches
Westinghouse Elec. & Mfg. Co.

Cars, Dump
Differential Car Co.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.
Kerschner Co., Inc., W. R.

Cars, Section
Mudge & Co

Cars, Self-Propelled
Electric Storage Battery Co.
General Electric Co.

Castings, Brass, Composition or Copper
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.
More-Jones Brass & Metal Co.

Castings, Gray Iron and Steel
American Steel Foundries
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.
Standard Steel Works Co.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Catchers and Retrievers, Trolley
Electric Service Supplies Co.
Holden & White, Inc.
Kerschner Co., Inc., W. R.
Ohio Brass Co.
Wood Co., Chas. N.

Circuit Breakers
Automatic Reclosing Circuit Breaker Co.
The Cutter Electrical & Mfg. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Clamps and Connectors for Wires and Cables
Electric Railway Equipment Co.
Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Hubbard & Co.
Klein & Sons, Mathias
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Cleaners and Scrapers Track—(See also Snow-Plows, Sweepers and Brooms.)
Brill Co., The J. G.
Ohio Brass Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling—(See Conveying and Hoisting Machinery.)

Coil Banding and Winding Machines.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Coils, Armature and Field
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Independent Lamp & Wire Co.
Rome Wire Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines
International Register Co., The
Johnson Fare Box Co.

Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.
Wood Co., Chas. N.

Commutator Slotting Files
Handy Supply Co.

Commutator Stones
Handy Supply Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Electrical Mfg. Co.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Mica Insulator Co.
Westinghouse Elec. & Mfg. Co.

Compressors, Air
General Electric Co.
Westinghouse Trac. B. Co.

Condensers
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Conduits, Underground
Johns-Manville Co., H. W.

Connectors, Solderless
Westinghouse Elec. & Mfg. Co.

Controller Regulators
Electric Service Supplies Co.

Controllers or Parts
Columbia M. W. & M. I. Co.
General Electric Co.
Johns-Manville Co., H. W.
Kerschner Co., Inc., W. R.
Westinghouse Elec. & Mfg. Co.

Controlling Systems
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Converters, Rotary
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Conveying and Hoisting Machinery
Columbia M. W. & M. I. Co.
Green Engrg. Co.

Conveyors, Belt
Portable Machinery Co.

Conveyors, Coal and Ash
Portable Machinery Co.

Conveyors, Portable
Portable Machinery Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Samson Cordage Works.

Cord Connectors and Couplers
Electric Service Supplies Co.
Samson Cordage Works.
Wood Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
Van Dorn Coupler Co.
Westinghouse Trac. B. Co.

Cranes
Toledo Bridge & Crane Co., The

Creosoting. (See Wood Preservatives)

Cross Arms. (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossing Signals. (See Signals, Crossing)

Crossings, Track. (See Track, Special Work)

Culverts
Canton Culvert & Silo Co.

Curtains and Curtain Fixtures
Brill Co., The J. G.
Du Pont Fabrikoid Co.
Electric Service Supplies Co.
St. Louis Car Co.

Cutting Apparatus, Oxy-Acetylene
Imperial Brass Mfg. Co.
Oxweld Acetylene Co.

Derailing Devices. (See also Track Work)
Cleveland Frog & Crossing Co.

Destination Signs
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Detective Service
Wish Service, Inc., P. Edward.

Dogs, Lathe
Williams & Co., J. H.

Doors, Asbestos
Johns-Manville Co., H. W.

Door Operating Devices
Consolidated Car Heating Co.
National Pneumatic Co., Inc.
Safety Car Devices Co.

Doors and Door Fixtures
Brill Co., The J. G.
General Electric Co.
Hale & Kilburn Corp.

Doors, Folding Vestibule
National Pneumatic Co., Inc.

Draft Rigging. (See Couplers)

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were the first exponents of the Art of Electrical Measurement as it is known today. But of far greater importance is the fact that since the beginning substantially every advance in the Art has originated with this Company and found its first embodiment in this Company's Instruments.

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Minneapolis
New Orleans
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Seattle
Toronto
Montreal
Halifax
Winnipeg
Vancouver
Calgary, Alta.
Florence, Italy
London
Copenhagen
Johannesburg, S. A.
Mexico City
Rio de Janeiro
Valparaiso, Chile
Santiago, Chile
Buenos Aires
Havana
Batavia, Dutch East Indies

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WHAT AND WHERE TO BUY

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Electric Service Supplies Co.
Niles-Bement-Pond Co.
Ohio Brass Co.

Dryers, Sand
Electric Service Supplies Co.
Zelnicker Supply Co., Walter A., Inc.

Electrical Wires and Cables
Roebling's Sons Co., J. A.

Engineers, Consulting, Contracting & Operating
Archbold-Brady Co.
Arnold Co., The
Beeler, John A.
Byllesby & Co., H. M.
Ford, Bacon & Davis.
Republic Engineers, Inc.
Richey, Albert S.
Sanderson & Porter.
Scofield Engineering Co.
Stone & Webster.
White Companies, The J. G.
Woodmansee & Davidson Engineering Co.

Engines, Gas and Oil
Westinghouse Elec. & Mfg. Co.

Engines, Steam
Westinghouse Elec. & Mfg. Co.

Fare Boxes
Brill Co., The J. G.
Cleveland Fare Box Co.
International Register Co., The
Johnson Fare Box Co.
National Railway Appliance Co.

Fences, Woven Wire and Fence Posts
American Steel & Wire Co.
Page Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Cleveland Fare Box Co.
Electric Service Supplies Co.
Star Brass Works.

Fibre and Fibre Tubing
Johns-Manville Co., H. W.
Westinghouse Elec. & Mfg. Co.

Field Coils. (See Coils)

Filters, Water
Scaife & Sons Co., Wm. B.

Fire Extinguishing Apparatus
Johns-Manville Co., H. W.

Fire Extinguisher, Liquid
Castle, Inc., James M.

Fireproofing Materials
Johns-Manville Co., H. W.

Floodlights
Electric Service Supplies Co.

Flooring Composition
American Mason Safety Tread Co.
Johns-Manville Co., H. W.

Forgings
Eureka Co.
Standard Steel Works Co.
Williams & Co., J. H.

Frogs, Track. (See Track Work)

Furnaces. (See Stokers)

Fuses and Fuse Boxes
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Fuses, Refillable
Columbia M. W. & M. I. Co.
General Electric Co.

Gaskets
Johns-Manville Co., H. W.
Power Specialty Co.
Westinghouse Traction Brake Co.

Gas Producers
Westinghouse Elec. & Mfg. Co.

Gates, Car
Brill Co., The J. G.

Gages, Oil and Water
Ohio Brass Co.

Gear Blanks
Carnegie Steel Co.
Standard Steel Works Co.

Gear Cases.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Kerschner Co., Inc., W. R.
Thayer & Co., Inc.
Westinghouse Elec. & Mfg. Co.

Gears and Pinions
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Kerschner Co., Inc., W. R.
National Railway Appliance Co.
Nuttall Co., R. D.
Poole Engineering & Machine Co.
Tool Steel Gear & Pinion Co.

Gears, Reduction
Poole Engineering & Machine Co.

Generating Sets, Gas-Electric
General Electric Co.

Generators
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Gongs. (See Bell and Gongs)

Graphite
Morgan Crucible Co.

Greases. (See Lubricants)

Grinders and Grinding Supplies
Metal & Thermit Corp.
Railway Track-work Co.

Grinding Blocks and Wheels
Railway Track-work Co.

Guards, Trolley
Electric Service Supplies Co.
Ohio Brass Co.

Harps, Trolley
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
Hensley Trolley & Mfg. Co.
Holland Trolley Supply Co.
More-Jones B. & M. Co.
Nuttall Co., R. D.
Star Brass Works.

Headlights
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.

Headlinings
Kerschner Co., Inc., W. R.

Heaters, Car (Electric)
Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
Smith Heater Co., Peter.

Heaters, Car, Hot Air and Water
Cooper Heater Co.
Smith Heater Co., Peter.

Heaters, Car (Stove)
Electric Service Supplies Co.
Smith Heater Co., Peter,

Hoists and Lifts
Columbia M. W. & M. I. Co.
Duff Mfg. Co.
Ford Chain Block & Mfg. Co.
Niles-Bement-Pond Co.
Toledo Bridge & Crane Co., The

Hose, Bridges
Ohio Brass Co.

Hose, Pneumatic and Fire
Johns-Manville Co., H. W.
Westinghouse Traction Brake Co.

Hydraulic Machinery
Niles-Bement-Pond Co.

Inspection
Electrical Testing Lab's.

Instruments, Measuring, Testing and Recording
Economy Electric Devices Co.
General Electric Co.
Johns-Manville Co., H. W.
Westinghouse Elec. & M. Co.
Weston Elec'l Instrument Co.

Insulating Cloth, Paper and Tape
Freydberg Bros., Inc.
General Electric Co.
Irvington Varnish & Insulator Co.
Johns-Manville Co., H. W.
Mica Insulator Co.
Standard Paint Co.
Standard Underground Cable Co
Standard Woven Fabric Co.
Westinghouse Elec. & M. Co.

Insulation. (See also Paints)
Anderson M. Co., A. & J. M.
Drew Electric & Mfg. Co.
Electric Service Supplies Co.
General Electric Co.
Holden & White, Inc
Johns Manville Co., H W.
Mitchell-Rand Mfg. Co
Westinghouse Elec. & M. Co.

Insulators. (See also Line Material)
Anderson M. Co., A. & J. M
Electric Railway Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Insulator Pins
Electric Service Supplies Co.
Hubbard & Co.

Insulated Wire Cutters
Rubber Insulated Metals Corp.

Insurance, Fire.
Marsh & McLennan

Jacks. (See also Cranes, Hoists and Lifts)
Brill Co., The J. G.
Buckeye Jack Mfg. Co.
Columbia M. W. & M. I. Co.
Duff Manufacturing Co.
National Ry. Appliance Co.
Templeton, Kenly Co., Ltd.

Joints, Rail
Carnegie Steel Co.
Lackawanna Steel Co.
Rail Joint Co.
Reading Specialties Co.
Zelnicker Supply Company, Inc., Walter A.

Journal Boxes
Bemis Car Truck Co.
Brill Co., The J. G.

Junction Boxes
Johns-Manville Co., H. W.
Standard Underground Cable Co.

Laboratory
Electrical Testing Lab's.

Lamp Guards and Fixtures
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Lamps, Arc and Incandescent. (See also Headlights)
Anderson M. Co., A. & J. M.
General Electric Co.
Westinghouse Elec. & M. Co.

Lamps, Signal and Marker
Nichols-Lintern Co.
Ohio Brass Co.

Lathes
Seneca Falls Mfg. Co.

Lathe Attachments
Williams & Co., J. H.

Lathes, Car Wheel
Niles-Bement-Pond Co.

Lighting Regulators, Car
Holden & White, Inc.

Lightning Protection
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Line Material. (See also Brackets, Insulators, Wires, etc.)
Anderson M. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Drew Electric & Mfg. Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Eureka Co.
General Electric Co.
Holden & White, Inc.
Hubbard & Co.
Johns-Manville Co., H. W.
More-Jones B. & M. Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Liquid Fire Extinguisher
Castle, Inc., James M.

Locomotives, Electric
Brill Co., The J. G.
General Electric Co.
McGuire-Cummings Mfg. Co.
Westinghouse Elec. & M. Co.

Lubricating Engineers
Galena-Signal Oil Co.

Lubricants, Oil and Grease
Galena-Signal Oil Co.

Lumber. (See Poles, Ties, etc.)

Machine Tools
Columbia M. W. & M. I. Co.

Machine Work
Columbia M. W. & M. I. Co.
Holden & White, Inc.

Mats
Johns-Manville Co., H. W.

Meters, Car, Watt-Hour
Economy Electric Devices Co.

Meters. (See Instruments)
Electric Service Supplies Co.
Wood Co., Chas. N.

Mica
Mica Insulator Co.
Schoonmaker Co., A. O.

Mirrors for Motormen
Drew Elec. & Mfg. Co.

Motors, Electric
Westinghouse Elec. & M. Co.

Motor Generation, Bonding and Welding
Lincoln Bonding Co.

Nuts and Bolts
Barbour-Stockwell Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Hubbard & Co.
Lackawanna Steel Co.

Oils. (See Lubricants)

Oxy-Acetylene. (See Cutting Apparatus, Oxy-Acetylene)

Packing
Johns-Manville Co., H. W.
Power Specialty Co.
Westinghouse Traction Brake Co.

Packing Rings
Johns-Manville Co., H. W.

Paints and Varnishes. (Insulating)
Irvington Varnish & Insulator Co.
Johns-Manville Co., H. W.
Mica Insulator Co.
Mitchell-Rand Mfg. Co.
Standard Paint Co.

Paints & Varnishes (Preservative)
Johns-Manville Co., H. W.
Standard Paint Co.

Paints and Varnishes for Woodwork
National Ry. Appliance Co.

Paving Material
Am. Brake Shoe & Fdy. Co.

Pickups, Trolley Wire
Electric Service Supplies Co.
Ohio Brass Co.

Pinion Pullers
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Wood Co., Chas. N.

Pinions. (See Gears)

Pins, Case Hardened, Wood and Iron
Bemis Car Truck Co.
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Traction Brake Co.

Pipe
National Tube Co.

Pipe Fittings
Power Specialty Co.
Standard Steel Works Co.
Westinghouse Traction Brake Co.

Planers. (See Machine Tools)

Pliers, Insulated.
Electric Service Supplies Co.
Rubber Insulated Metals Corp.

Pole Reinforcing
Hubbard & Co.

Pole Sleeves
Drew Elec. & Mfg. Co.

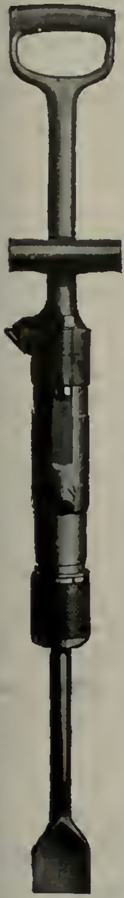
Poles and Ties, Treated
Lindsley Bros. Co.
Valentine-Clark Co.

Poles, Metal Street
Bates Expanded Steel Truss Co.
Electric Railway Equipment Co.
Hubbard & Co.

Poles, Ties, Posts, Piling and Lumber
Lindsley Bros. Co.
Valentine-Clark Co.
White Marble Lime Co.

Poles, Trolley
Bayonet Trolley Harp Co.
Columbia M. W. M. I. Co.
Electric Service Supplies Co.
Holland Trolley Supply Co.
National Tube Co.
Nuttall Co., R. D.

Poles, Tubular Steel
Electric Railway Equipment Co.
National Tube Co.



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Bulletin 9023.

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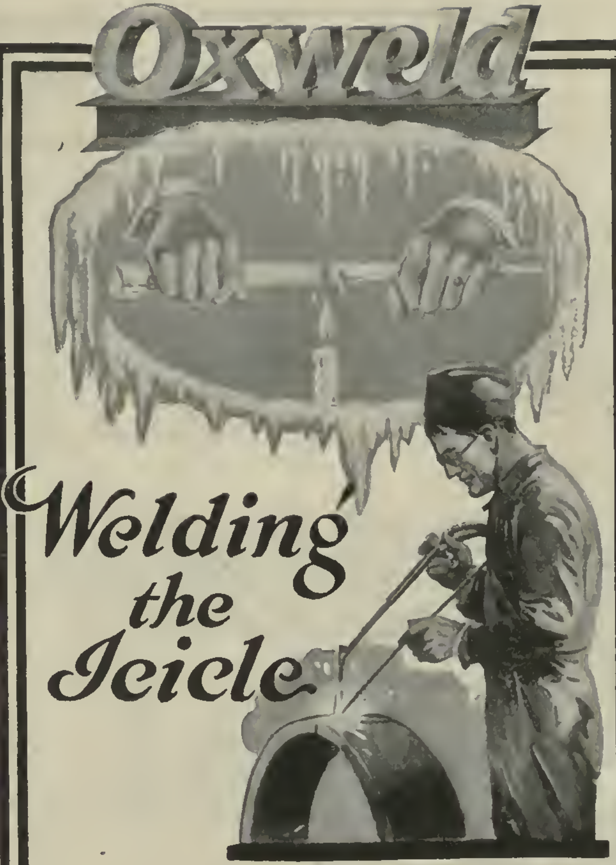

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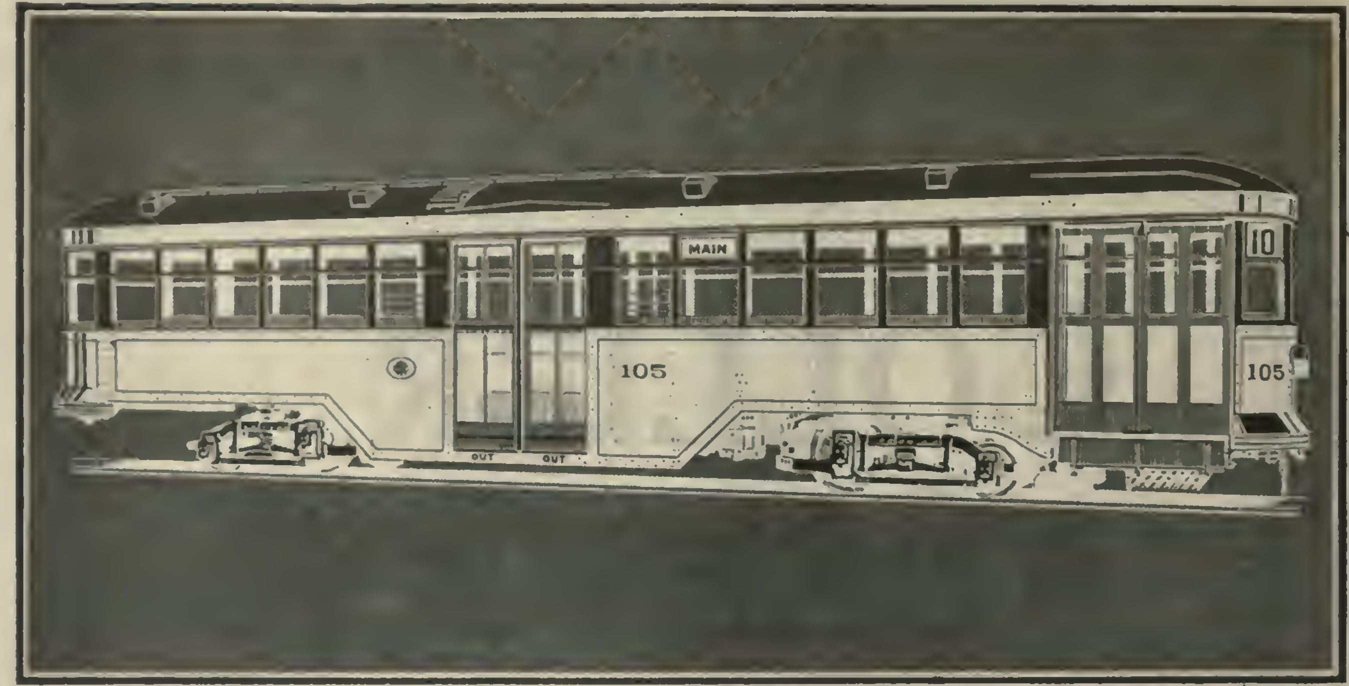

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25-35

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ELECTRIC RAILWAY JOURNAL

lissing Jan 25

EVIDENCE

e Massachusetts Public Service
, November 20, 1918, in the Bay
Railway Zone Rate Case:—

n: You say that you are
how much through the
these (Economy) Meters?

: At the rate of saving
unning on the north of
and in the Quincy dis-
is slightly over $100,000
of coal per annum at the
price of coal, $9.80.

n: How much did they
onomy Meters) cost?

: The total cost of the
was $57,000. There
239 of them.

* * *

small railways which adopted
nstallations are:
vns Railway Co.
ailways.
Cincinnati Street Railway Co.
lities.
o.
o.

ver-Saving Bulletins.

ny Bldg., CHICAGO

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The General Electric Class T locomotives on the New York Central lines have given very satisfying results both as to durability and cost of upkeep. With materials and labor costs during 1918 higher than ever before, the

taining and repairing each locomotive averaged but 3.9 cents a mile. Locomotives were inspected after each 3,000 miles and averaged 33,000 miles per detention.

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Gene

Schene

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EVIDENCE

Before the Massachusetts Public Service Commission, November 20, 1918, in the Bay State Street Railway Zone Rate Case:—

Question: You say that you are saving how much through the use of these (Economy) Meters?

Answer: At the rate of saving now running on the north of Boston, and in the Quincy district, it is slightly over $100,000 worth of coal per annum at the present price of coal, $9.80.

Question: How much did they (the Economy Meters) cost?

Answer: The total cost of the meters was $57,000. There were 1239 of them.

* * *

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San Diego Electric Railway.
Chicago & West Towns Railway Co.
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SOLD OR LEASED

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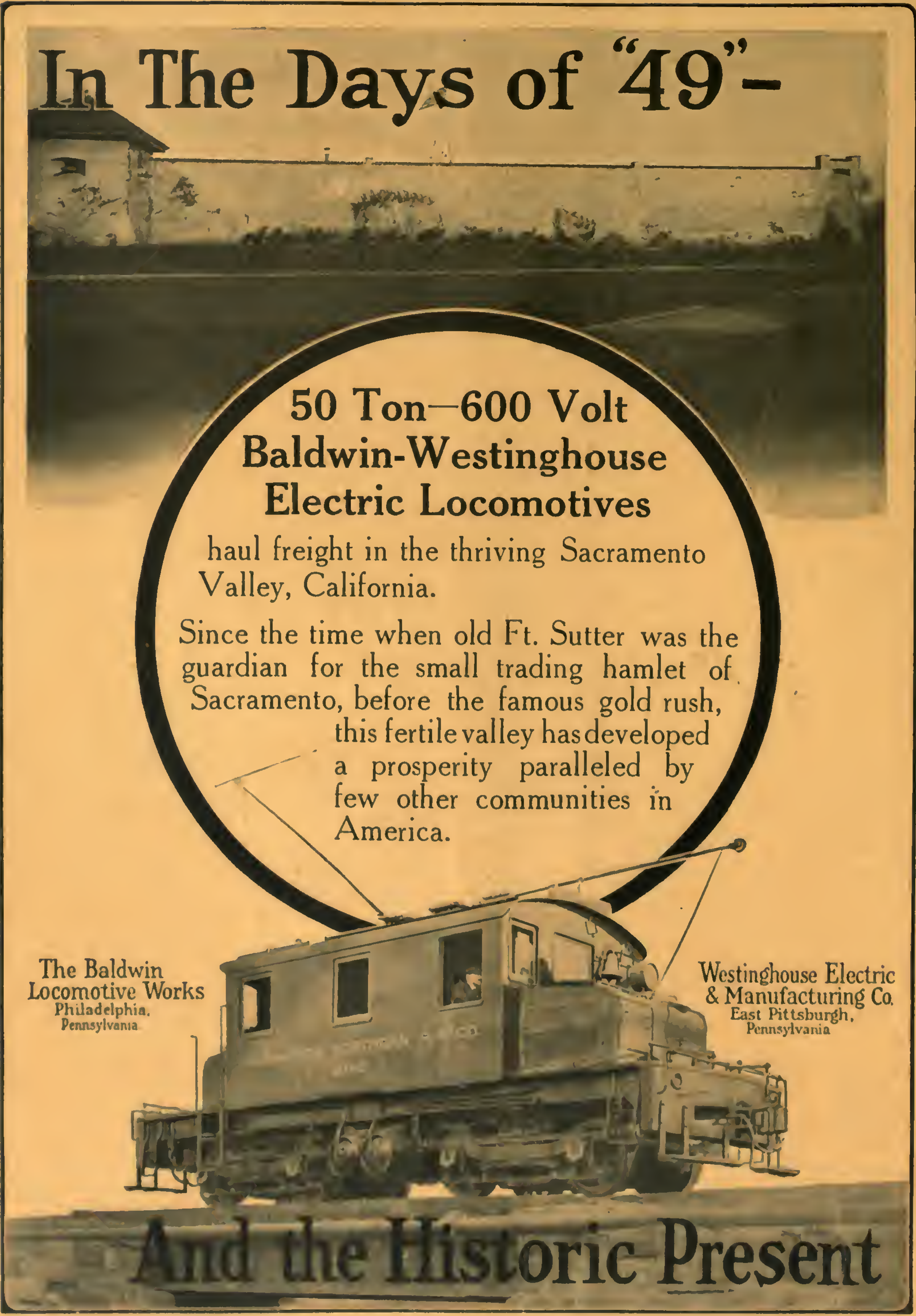

In The Days of "49"-

50 Ton—600 Volt Baldwin-Westinghouse Electric Locomotives

haul freight in the thriving Sacramento Valley, California.

Since the time when old Ft. Sutter was the guardian for the small trading hamlet of Sacramento, before the famous gold rush, this fertile valley has developed a prosperity paralleled by few other communities in America.

The Baldwin
Locomotive Works
Philadelphia,
Pennsylvania

Westinghouse Electric
& Manufacturing Co.
East Pittsburgh,
Pennsylvania

And the Historic Present

Vol. 53, *No.* 5 New York, February 1, 1919 *Pages* 215 *to* 262

Electric Railway Journal

H. W. BLAKE, *Editor*

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What Electric Freight Handling Requires and Costs

Electric railways have a drastic need of adequate freight terminals, and mechanical freight-handling devices should supplant brute-power devices in the interest of scientific and economical management. A. B. Cole gives valuable operating data for electric and steam line freight houses........Page 218

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The Electric Railways of Connecticut Need Help

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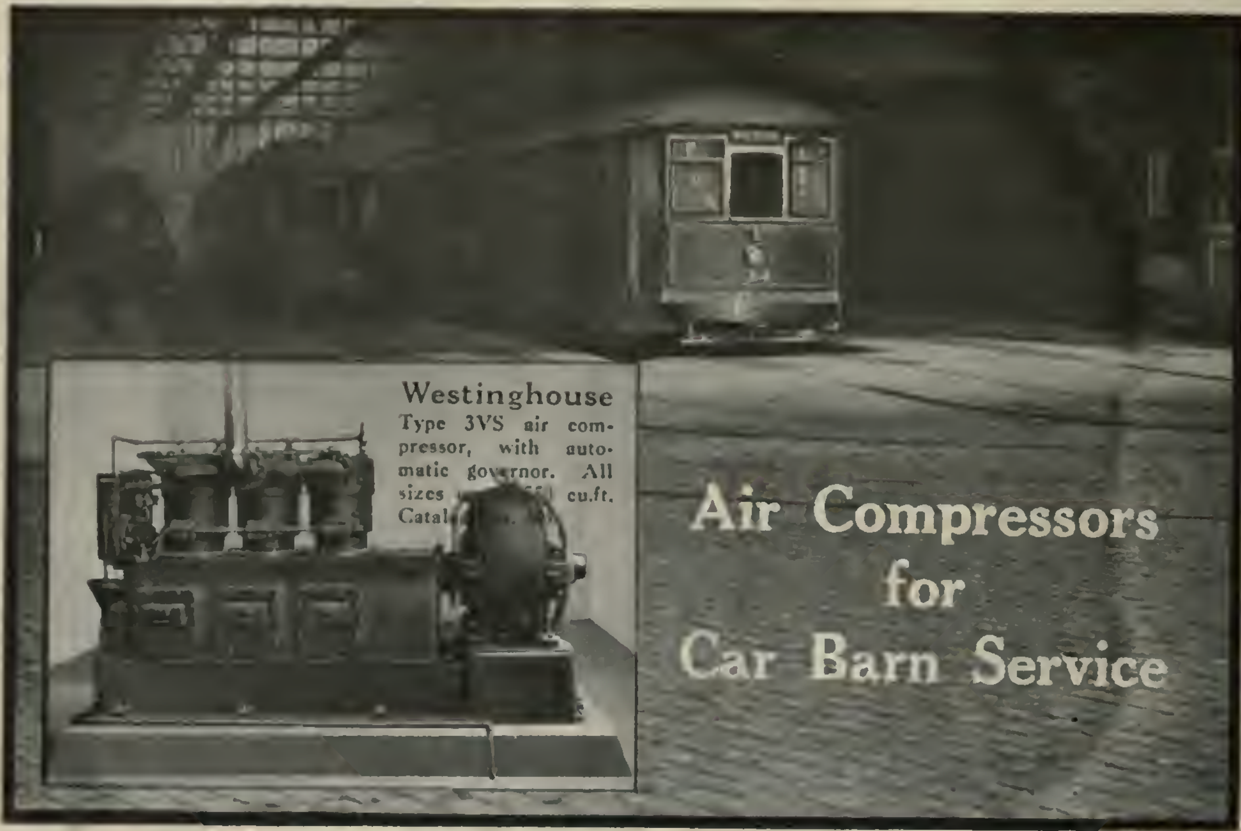
Westinghouse
Type 3VS air compressor, with automatic governor. All sizes [illegible] cu.ft. Catal[illegible].
Air Compressors for Car Barn Service

Systematic maintenance of air brakes on cars is essential to safe service and economical operation.

Westinghouse Industrial Air Compressors Being Compact, Highly Efficient and Durable

are perfectly suited to both air brake testing and use of pneumatic tools, etc.; also, the many other electrical railway uses in which air pressure is daily becoming a necessity.

Westinghouse Traction Brake Company

General Offices and Works, Wilmerding, Pa.

Atlanta, Ga.
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Columbus, O.
Denver, Col.
Houston, Tex.
Los Angeles, Cal.
Mexico City
New York, N. Y.
Pittsburgh, Pa.
San Francisco
Seattle, Wash.
St. Louis, Mo.
St. Paul, Minn.

Westinghouse

Underfeed, Roney and Chain Grate Stokers

Our Attica Works-

The building of Westinghouse Stokers is not a side issue.

Stokers are the one product of a separate factory and a separate engineering organization located at Attica, N. Y., with Sales Offices in East Pittsburgh.

In addition, Westinghouse Stokers are of three distinct types—Underfeed, Roney and Chain Grate—each with its own field of application, and together covering the entire field of coal burning.

The choice of a stoker always narrows down to a study of plant requirements.

We make our recommendations. The choice of type is left to you.

**Westinghouse Electric and
Manufacturing Co.
East Pittsburgh, Pa.**

WESTINGHOUSE
ELECTRIC

Pull Pedestrians from the Sidewalks

by operating your cars with Safety Car Control Equipments

Americans are good sports and the best riders in the world—*if they get the service.*

That fact has been proved again and again in cities where the shorter headways made practicable by Safety Car Control Equipments have turned thousands of automobilists and pedestrians into car riders.

There surely is a Riding Habit in America. But let our Safety Car Control Equipments help you to make it the habit of riding on *rails* instead of *rubber!*

SAFETY CAR DEVICES CO.

Main Office—Boatmen's Bank Bldg., ST. LOUIS, MO.

CHICAGO
Railway Exchange Building

NEW YORK
City Invest. Building

PITTSBURGH
Westinghouse Building

CANADA—Canadian Westinghouse Co., Ltd., Hamilton, Ont.

O B PRODUCTS

Quality First

Fundamental Principles

A motor requires a certain number of WATTS for a given effort and is rated for certain VOLTS.

Watts = Volts x Amperes

If the VOLTS drop below motor rating the AMPERES must increase.

The motor pulls its full load and reaches its best speed only at rated VOLTS.

When the motor draws excessive AMPERES (as it does at low VOLTS) it overheats. Burnt-out armatures naturally result.

Now good bonding delivers the largest percentage of the power house VOLTS to the motor. With these results:—

(1) *Maximum motor capacity and speed.*

(2) *Minimum Motor troubles.*

(3) *Saving in power.*

So good bonds are a paying investment.

O-B Bonds are good Bonds.

The Ohio Brass Company, Mansfield, Ohio

New York Philadelphia Pittsburgh Chicago Los Angeles San Francisco

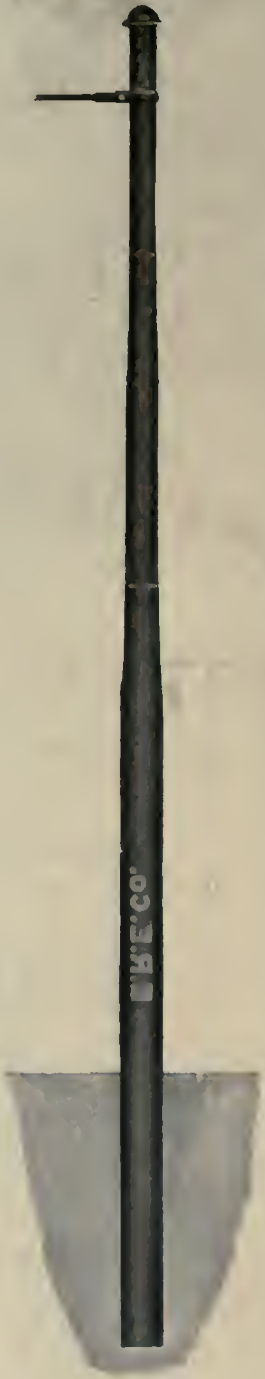
TUBULAR STEEL POLES
NOW AVAILABLE

During the war period the supply of steel for the manufacture of Tubular Poles was seriously curtailed.

We are now assured that the usual pre-war tonnage is available and it is with pleasure we announce that all orders for "ELRECO" Tubular Steel Poles can be handled promptly.

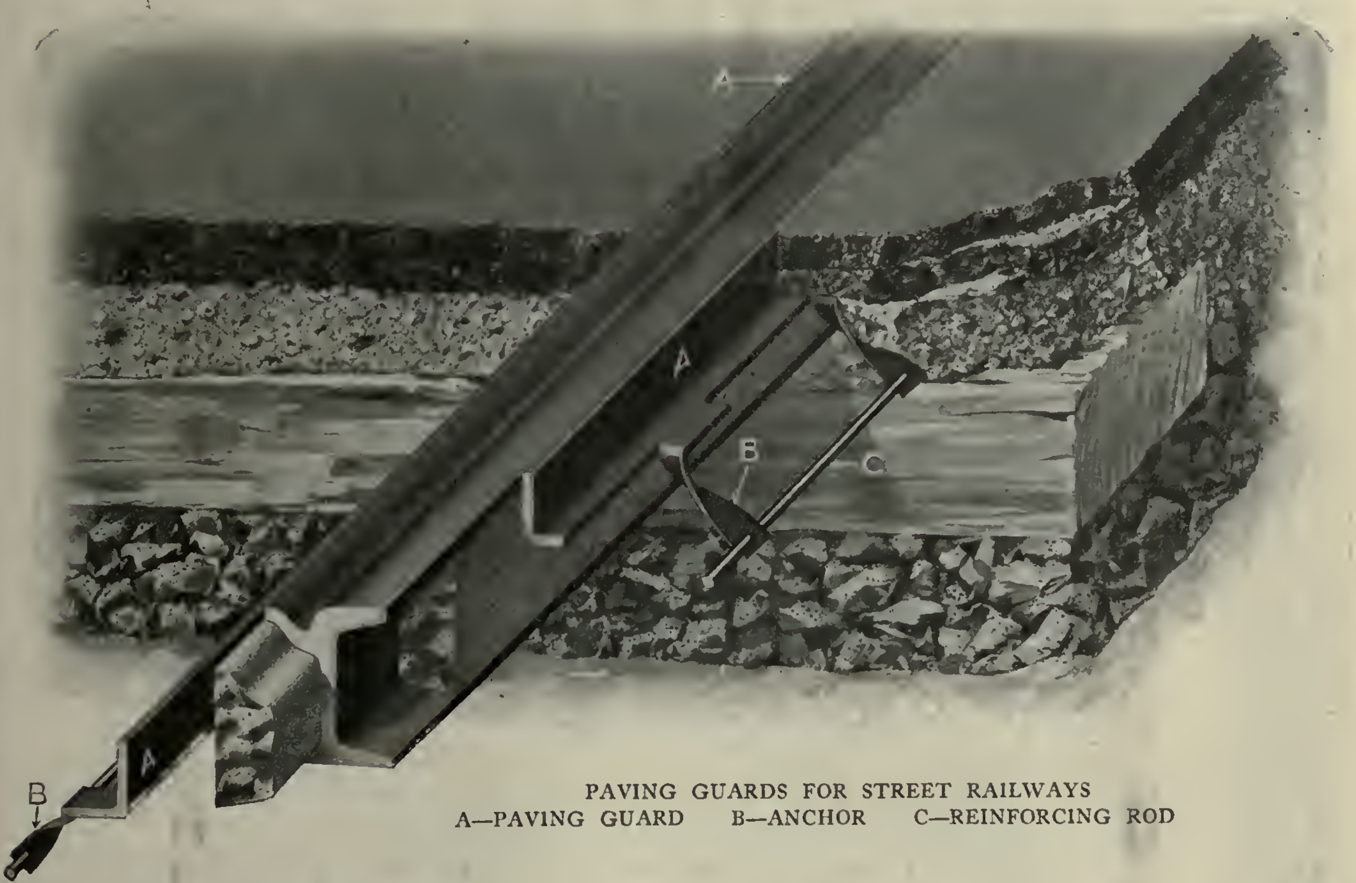
Inquiries received for Tubular Steel Poles since the signing of the armistice clearly indicate that not only future line construction is now being given careful consideration, but also that "permanent construction" is to be the watchword.

Hundreds of thousands "ELRECO" Tubular Steel Poles are in use for street railway and combination rail-light purposes in all parts of the country. They have made good at all times as the best poles, against every other form, style and shape of pole conceivable.



Electric Railway Equipment Co.

Cincinnati, Ohio
New York: 30 Church Street



PAVING GUARDS FOR STREET RAILWAYS
A—PAVING GUARD B—ANCHOR C—REINFORCING ROD

INTERNATIONAL PAVING GUARDS

Make a rigid construction—Solid and Trouble-Proof

International Paving Guards reinforce the edges of the roadway—hold in place the wearing surface—prevent water seeping below the surface — thus insuring a highly durable and economical edging.

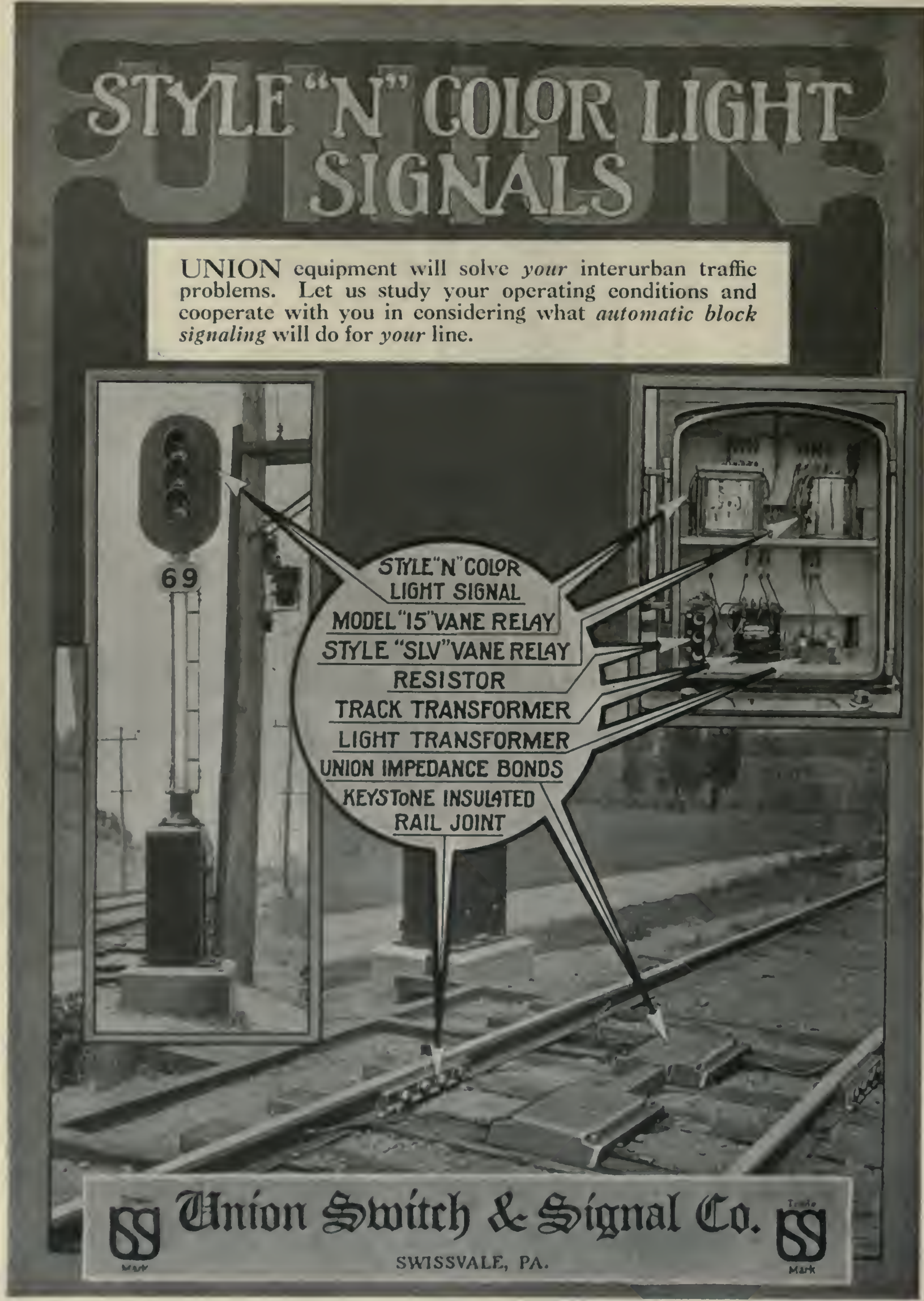
They fasten ties, rails and fillers together in a *semi-rigid* construction—a separate unit *free to vibrate*—without harm to adjoining paving.

The pavement remains in perfect condition under the heaviest traffic and varying climatic changes. Doesn't such pavement appeal to you from a money-saving stand point? It is *lasting* economy of this kind that keeps the dividends coming. *The picture shows how it looks.*

As International Steel Twin Ties and Crossing Foundations eliminate your track worries, the International Paving Guards put an end to continuous and costly paving repairs.

**Let us tell you more about our Paving Guards.
Ask for the Booklet.**

The International Steel Tie Company
Manufacturers of Steel Twin Ties and Crossing Foundations
General Sales Office and Works: Cleveland, Ohio



STYLE "N" COLOR LIGHT SIGNALS

UNION equipment will solve *your* interurban traffic problems. Let us study your operating conditions and cooperate with you in considering what *automatic block signaling* will do for *your* line.

Union Switch & Signal Co.

SWISSVALE, PA.

The Front End

The front end of a car is the business end. To increase your fare receipts do all you can to improve the appearance of that end.

"Golden Glow" Headlights with their penetrating beams of golden light make a great improvement. In all atmospheres, fog and rain, their silent service assists both patron and motorman.

Illuminated Destination and Route Number signs provide a great improvement, day and night; and do most to advertise your service.

Write for data on this equipment.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Streets

PITTSBURGH
337 Oliver Building

NEW YORK
50 Church Street

CHICAGO
Monadnock Building

200,000
Perry-Hartman Bearings
are reducing Flange Wear Today!

Double the life of your wheels—cut your pull-ins for wheel renewals by fifty per cent, decrease nosing, lessen flange and rail wear, reduce power consumption on curves and eliminate curve lubrication costs by using Perry-Hartman Bearings.

Forty-eight railways of the United States and Canada are securing these results today on both old and new equipment—their constant repeat orders are forcible testimony.

Send us sketches of your bolsters, present center plates or bearings and we will show you how Perry-Hartman Bearings can be quickly and economically applied—and without obligation on your part.

Holden & White Inc.
Electric Railway Distributors for the Joliet Railway Supply Company
817 Fisher Building, Chicago

National Railway Appliance Co., New York and Washington; C. E. A. Carr Co., Toronto; W. M. McClintock, St. Paul; Alfred Connor, Denver; L. Brandenburger, Salt Lake City; F. F. Bodler, San Francisco; S. I. Wallis, Los Angeles; W. F. McKenney, Portland, Ore.

Drawn from the product of
Copper Clad Steel Co. Pittsburgh

In *this* union there is *more than* strength

ARISTOS "Copperweld" Copper Clad Steel Wire makes transmission lines with the strength of steel—lines that safely resist much heavier wind pressures and sleet load, and give every efficiency that the most critical engineer could demand.

THE cost of the conductor itself is much less than solid copper that would do the same work, and the quadrupled tensile strength permits a wider spacing of supports that makes an enormous saving in poles, insulators, tie wires and the labor of placing.

THE economies in first cost and in line maintenance and the greater reliability and safety obtainable only by using "Copperweld" Wire are fully explained in this book.

Send for and read your copy.

PAGE STEEL & WIRE CO.

Established 1883 as Page Woven Wire Fence Co. *PLANTS: Monessen, Pa., and Adrian, Mich.*

Makers of "Copperweld" Copper Clad Steel Wire; ARMCO IRON Welding Rods and Electrical Wire; Wire Mill Products, Plain and Galvanized; Wire Fencing for all Purposes; Factory Gates; Wire of Special Analysis; Ornamental Iron Fence Machine; Guards, Tool and Stockroom Partitions; Architectural Iron.

Sales Offices: 30 Church Street, New York 32..

Western Representatives: Steel Sales Corporation, Chicago

Phono-Electric

Why San Francisco Prefers Phono-Electric

The experience of the United Railroads of San Francisco with various kinds of trolley wire at its great proving ground—the Market Street ferry loops—has led to the choice of Phono-Electric Trolley Wire for this and other locations.

An installation which gets pretty nearly all the types of cars in the city, which has a dozen different offsets and heights of wire and which carries 124 cars an hour on the outer loop alone is **quite** a proving ground.

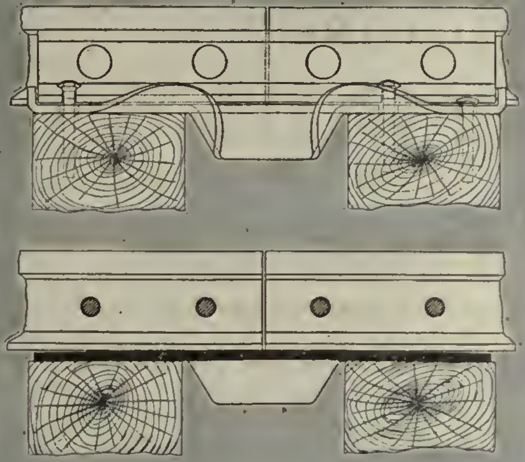
Bridgeport Brass Company
Bridgeport Connecticut

Phono-Electric welcomes proving ground comparisons

2070

Don't overlook this feature of

Abbott Rail-Joint Plates



THAT slight camber (exaggerated in the sketch) makes the rail ends bear first and bring the joint plate into action. Then as the wheel load approaches closer, the joint plate yields just enough to come into full flat bearing with the rail base and gives the weak part of the joint the entire support of the two joint ties.

This support, made stronger by the flanging on the plate, takes the downward stress off the angle bars, and therefore protects them from wearing, bending or taking a permanent set. For this reason also all tendency to stretch the bolts and to loosen the nuts is avoided.

It provides a base support to the rail ends without clamping the flanges or making the joint too rigid, and leaves perfect freedom for wave motion of the rails.

Tests on Abbott-Plated track have shown perfect alignment and smooth-running track surface after five years of service.

Ask our engineers to explain other desirable features.

Ask for our booklet
"Improved Track Appliances"

289

The ABBOTT RAIL JOINT PLATE
"BUILT LIKE A BRIDGE"

Lackawanna Steel Company
LACKAWANNA, N. Y.

ATLANTA CHICAGO
BOSTON CINCINNATI
BUFFALO CLEVELAND

DETROIT ST. LOUIS
NEW YORK SAN FRANCISCO
PHILADELPHIA HAVANA

The MECHANICAL RAILWAY TIE

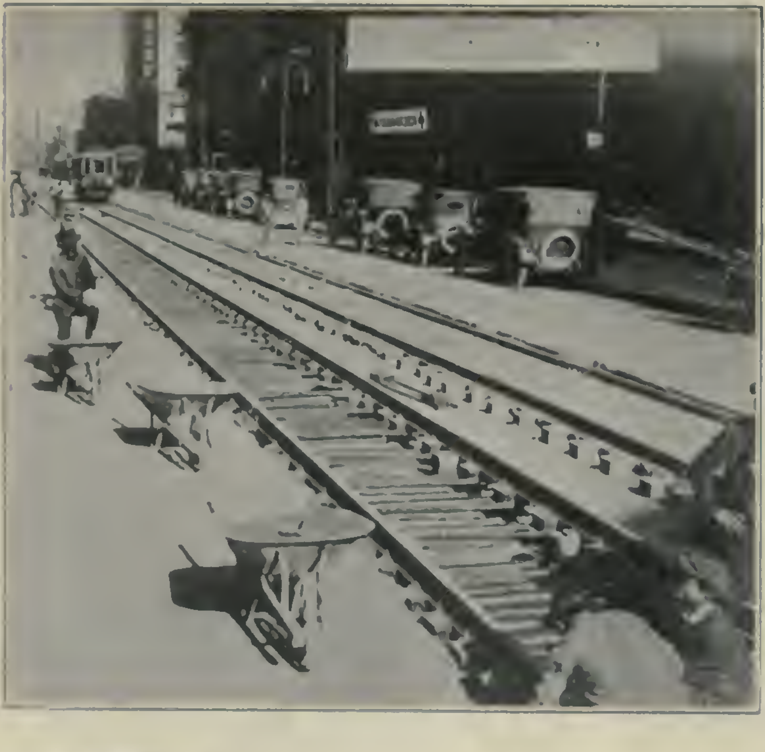
First Cost *and*

Final Cost

Wooden ties, without any of the labor cost of laying, are cheaper, piece for piece, than Dayton Mechanical Ties—we freely admit that!

Untreated wooden ties completely installed with gravel ballast cost 6% more than Dayton Mechanical Ties for the same length of track.

Wooden ties, at the end of ten years, cost more than twice as much as Dayton Mechanical Ties.



Furthermore:

D.M. Ties are permanent.

D.M. Ties outlast the pavement.

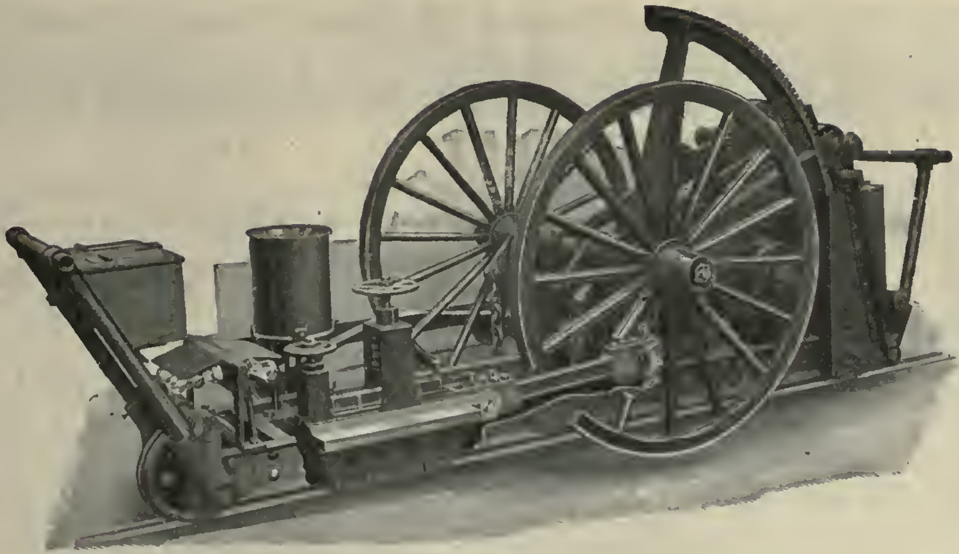
D.M. Ties are cushioned with an asphalt base, under the wooden rail support.

D.M. Ties are attached to the rails as shown in the picture on the left.

D.M. Ties form a rigid, reinforced concrete bed, each tie resting on its own highly resilient cushion.

Your inquiry for full particulars regarding Mechanical Railway Ties will be a step in the direction of better economy. Write today.

THE DAYTON MECHANICAL TIE CO.
201 Third Street Arcade
DAYTON, OHIO



Foresight!

the cornerstone of good management in any line of business.

Every time you see a

Reciprocating Track Grinder

at work (they are working on over 100 electric railway properties) you may be sure that the management of that property is both foresighted and farsighted.

Foresighted in seeing that "just beginning" cups at joints or incipient corrugations in rail will more or less rapidly develop bad track conditions, breakdown track foundations, injure car equipment, cause complaints from the public and force a probably early replacement by new track.

Farsighted in seeing that the final replacement and intermediate damage and loss caused by neglect of the incipient condition is a much more costly process in the end than is a policy keeping track smooth and in good condition with the aid of the Reciprocating Grinder.

Foresight and thrift go together in electric railway operation just as much as in individual life.

Railway Track-work Co.
30th and Walnut Sts., Philadelphia

THE *electric railway's greatest problem is that of cultivating better public relations. The good will of the public must be gained in order to secure increased revenue*

The best way to promote public good will is to provide good service, and good service is possible only with adequate expenditures for

MAINTENANCE

That is why maintenance methods at present are receiving more careful attention than ever before. The season for extensive maintenance work is fast approaching. Millions will be spent for materials, equipment and supplies within the next six months. As in the past years the

Annual

Maintenance Number

of Electric Railway Journal will be hailed as the guide to the latest methods and materials.

It will tell the field how to do the work and with what to do it. This issue, dated

March 22, 1919

will be a compendium of invaluable information for electric railway executives. An average of over seven copies for every electric railway and electrified steam road in America will be issued. It will blanket the buying power of the field 99.6 per cent.

The Advertising Section

will be made up with the same care as the text pages. It will, through the copy used by the representative manufacturers of the industry, convey to the reader accurate, informative data on the latest and best equipment, materials and supplies for maintenance and replacements in power plant, substation and repair shops, on the cars, track and overhead. Many properties are badly run down. Maintenance work must and will receive a strong impetus.

Get Ready to Get Your Share

Plan now. Map out an active selling and advertising campaign. Use the advertising columns of Electric Railway Journal from now on with full vigor. Start the big drive at once and lead up to the grand offensive in the big March 22 Maintenance issue. Now is the time that Journal advertising works at high efficiency.

If You Wish Assistance

in mapping out your campaign during the next six months or so, including your big Maintenance message, ask us to submit a proposition with copy, plan and cost. At all events, let us know your plans for using the big issue. The coupon makes it easy to register your wishes.

Electric Railway Journal

10th Avenue at 36th St., New York

Why not send the coupon today?

ELECTRIC RAILWAY JOURNAL:
10th Ave. at 36th St., New York.

Our wishes are indicated by the check marks placed opposite the options that interest us.

Option 1. Send a service representative to discuss plans and copy for possible use during the next six months. **check** ☐

Option 2. Prepare and submit for approval copy for a six months' campaign to cost about $______ **check** ☐

Option 3. Submit for approval an advertisement designed to occupy ______ pages in Maintenance Number. **check** ☐

Option 4. Reserve ______ pages in your Maintenance Number for which we will send you copy and cuts. **check** ☐

Remarks ______________________________

Name of Company ______________________________

Per ________________ *Position* ________________

Rates from $100 a page to $60 a page, according to amount of space used, or your contract rate if you are a regular advertiser.

A Spirit of Optimism!

> there is every reason why the electric railways should attack their problems in a spirit of optimism. Never before has the idea of justice and fairness been so noticeable among the people and their representatives as now at the conclusion of a war entered for the sake of these principles. Never before has the management of the railways been controlled by such broad-minded and skillful executives, and never before have the manufacturers of equipment been so adequately prepared to supply the physical needs of the industry.

Note that Statement!

BY CLARENCE RENSHAW
General Engineer Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., in Electric Railway Journal

Never before Irvington Insulating Products were put on the market was it possible to secure such *insurance* against power losses on cars and in the plant. To achieve THIS saving will be a considerable step toward better conditions in the industry. Chief among Irvington products is

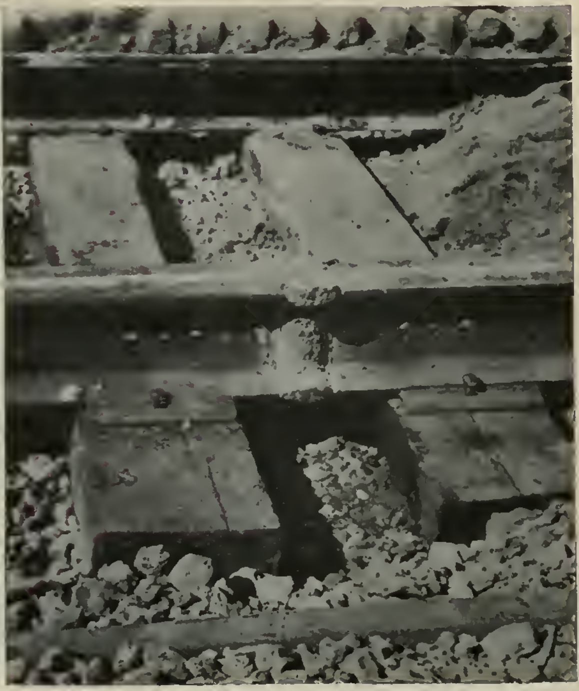
Irvington Black Varnished Cambric

—and broadminded and skillful executives on many roads do not need reminding of its efficiency. Irvington Insulating products are noted for their high resistance, high dielectric strength, non-hygroscopic qualities, heat resistance and neutrality to chemical action.

We manufacture, also, oiled silk, flexible varnished tubing, special paper for coil windings and yellow varnished cambric. The salvation of the electric railways will be worked out by efficient selection of materials as well as fairness from the people. Think it over.

IRVINGTON VARNISH & INSULATOR Co.
Irvington, New Jersey.

Pre-heating the rails previous to welding



Thermit insert weld before grinding

Thermit Insert Welds

executed by the Pittsburgh Railways Co.

Thermit Insert Welds are making up for the scarcity of plates and bonds, for the Pittsburgh Railways Company, at McKees Rocks, Pa. All the joints on a stretch of track relaid by them are welded by the Thermit Insert Process. The work on this track might have been seriously delayed had it not been possible to weld the joints by the Thermit Insert Process. We said "weld" the joints—but a better expression would have been "*obliterate*" for that is what the Thermit process accomplishes. The rail-union is 100% efficient, mechanically and electrically. In many cases, these welds eliminate the necessity of relaying old track with new rails—and it is the ONLY process whereby a not-too-battered rail joint can be repaired without cutting in a new piece of rail and making two joints in place of one. And Thermit Welds *hold*.

Allow us to send Catalog 1232*—or a representative*
to go into details with you.

Metal & Thermit Corporation

Successors to Goldschmidt Detinning Co. and the Goldschmidt Thermit Co.

120 BROADWAY, NEW YORK

329-333 Folsom St., San Francisco
7300 So. Chicago Ave., Chicago
15 Emily St., Toronto, Ont.
1427-1429 Western Ave., Pittsburgh, Pa.
Factories located at Chrome, N. J.; Wyandotte, Mich.; East Chicago, Ind.; Jersey City, N. J.

At San Francisco

San Francisco has many cars of the famous California type—cross-seats in front and rear, semi-open compartments, and longitudinal seats in the closed central compartments.

One might suppose that reversible seats always exposed to a dampish atmosphere would tend to work hard.

But that's not the case with the Hale and Kilburn "Walkover" seats which are on several score of the more modern United cars and also on many Municipal cars. They are just as easy to reverse as in much dryer climates.

With the care that their mechanisms receive in San Francisco, these Hale and Kilburn seats will give many years of trouble-free service.

WALKOVER
COPYRIGHTED

Hale & Kilburn Corp.

Philadelphia
Washington
Detroit

New York
Atlanta
Chicago

San Francisco
Louisville
St. Louis

WALKOVER
COPYRIGHTED

National Pneumatic Door and Step Control has brought the Laborless Car

The curse of Adam has been lifted off of the electric car platform by National Pneumatic Door and Step Control which has put intelligence before physique, brain before brawn.

On subway and elevated cars National Pneumatic control reduces the duties of the guard to that of an *announcer*. On surface cars National Pneumatic control reduces the duties of the conductor to that of a *cashier*.

Could your platform problem be made simpler than this?

NATIONAL PNEUMATIC COMPANY INC.

50 Church St. New York

515 Laflin St. Chicago

Water- and Dust-Tight Condulets

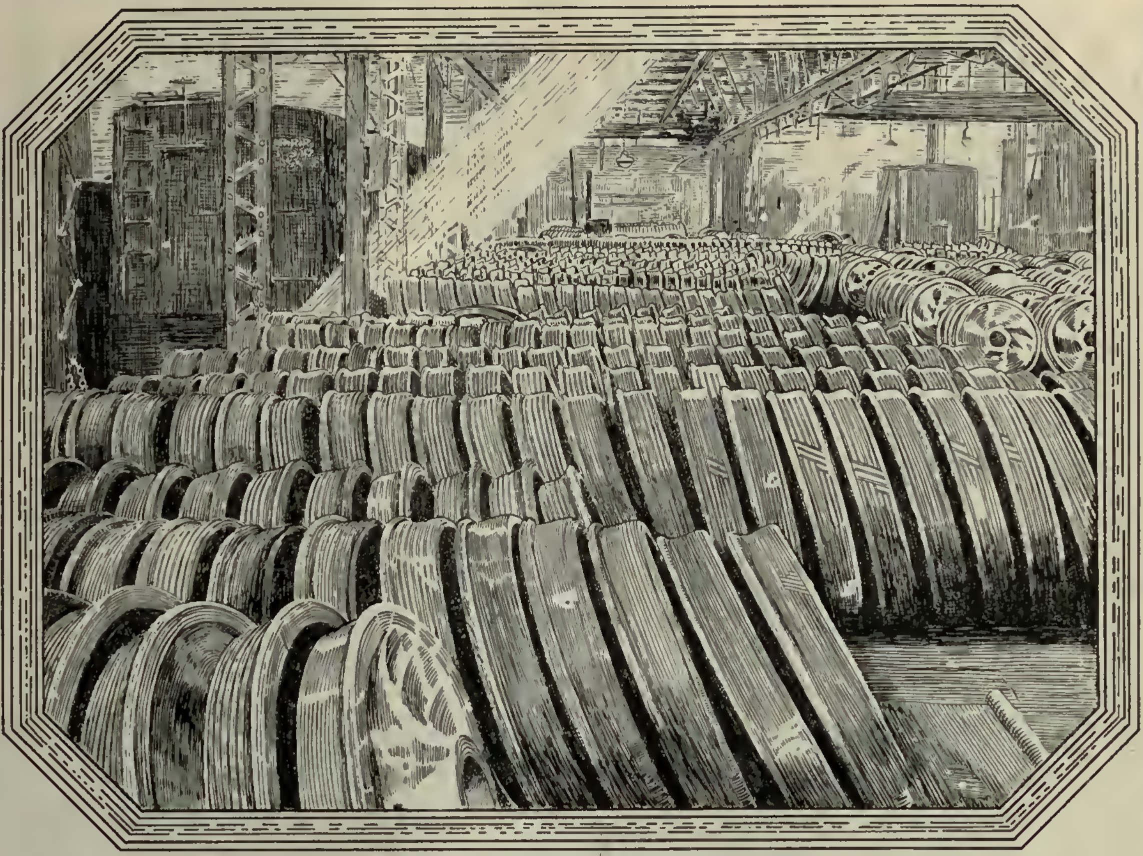
V and VH Series with Key Socket Attachment

Type V—One of a Complete Series of Condulets Particularly Adapted for use in Textile and Flour Mills—Made in All Combinations and Sizes—Brass or Iron, as Specified

WRITE FOR CONDULET BULLETIN No. 1000H

CROUSE-HINDS COMPANY
SYRACUSE, N. Y., U. S. A.

NEW YORK BOSTON CHICAGO



The Production of The Efficient Car Wheel

Our engineers have perfected and our workmen produce a wheel which is the standard for electric railway service.

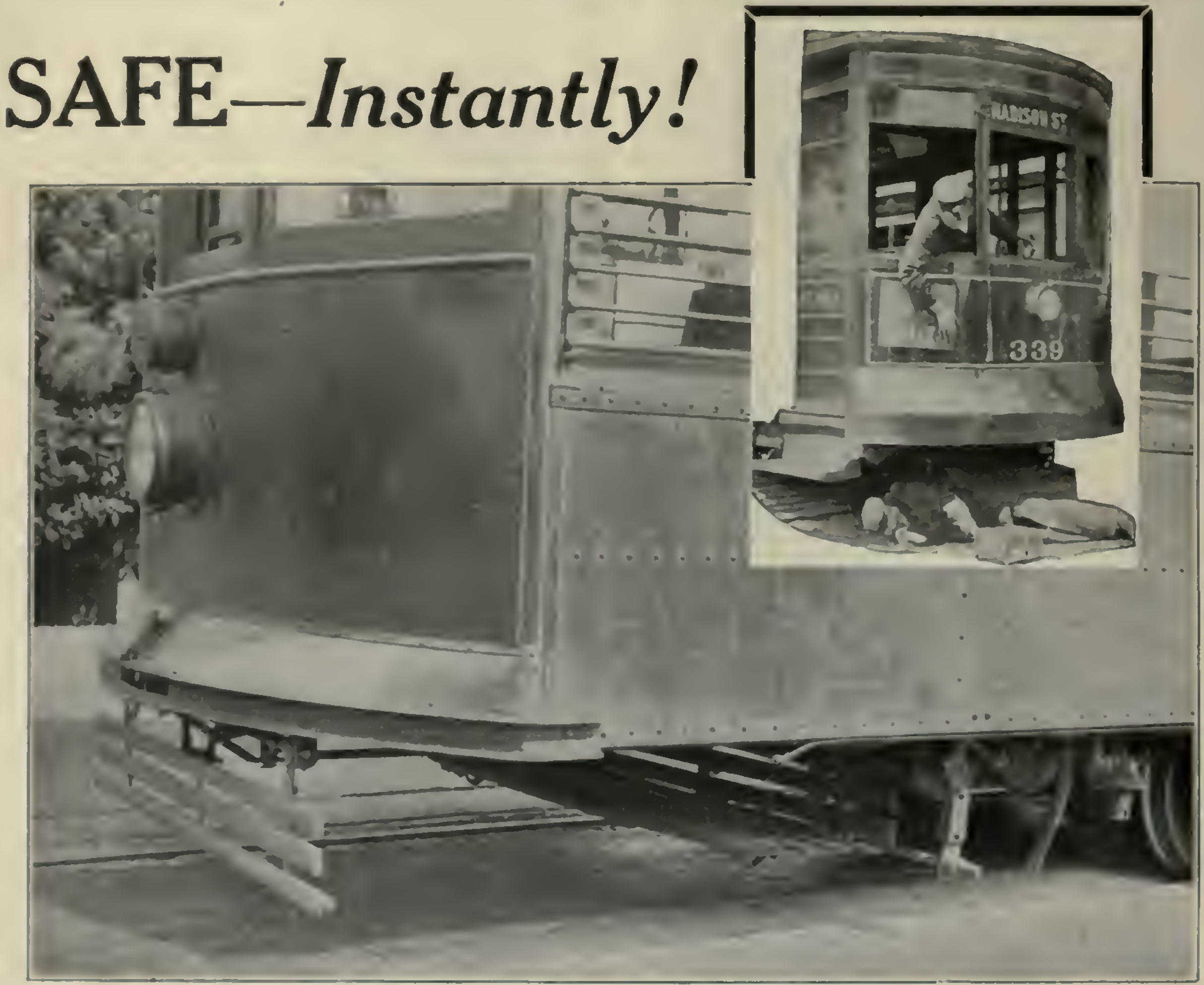
Davis One Wear Steel Wheels

are made of soft ductile steel in plate and hub, and hard tough manganese steel in flange and tread.

American Steel Foundries

1100 McCormick Building, Chicago

SAFE—*Instantly!*



H-B Life Guards

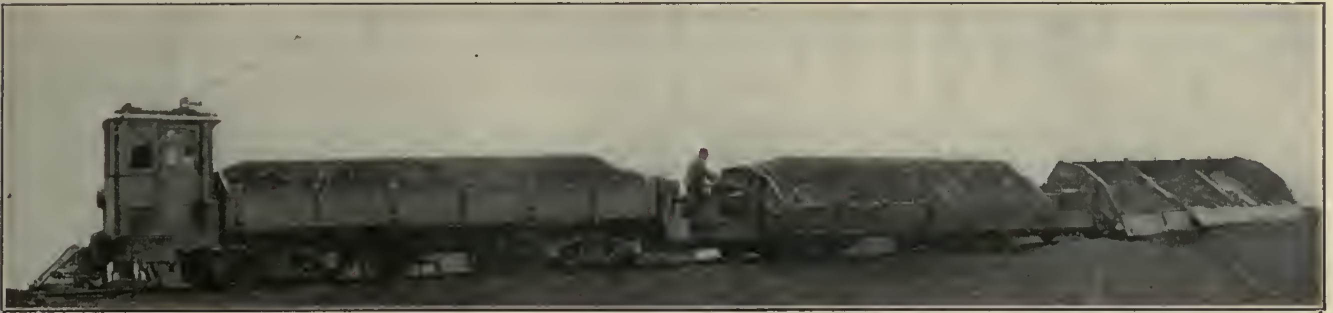
are

Barriers of Safety

between the car wheels and the body of the fallen pedestrian—
between your road and damage claims.

Perfect Safety—Instantaneous Tripping Action

THE CONSOLIDATED CAR FENDER COMPANY
PROVIDENCE, R. I.
General Sales Agent WENDELL & MACDUFFIE CO. 61 Broadway, N. Y.

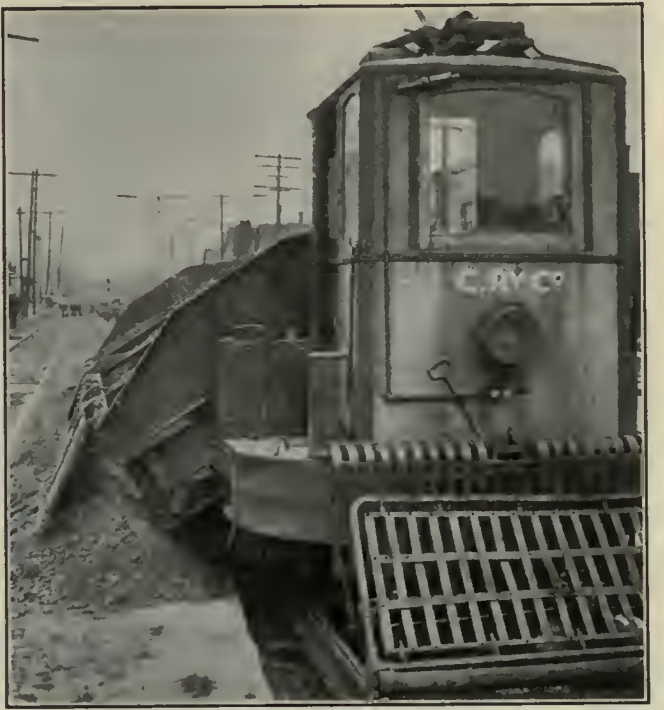


Rejuvenating Your Track?

Then load and unload your ballast or paving material *with fewer men*—

Keep up your regular passenger schedules on *clear tracks*—and

Cut Labor Costs
with
Differential Electric Dumping Cars



These all steel cars are designed for side dumping by means of an electric motor. They can be tilted with perfect safety by an unskilled laborer.

Loading can be done while in the tilted position at a *large saving in shoveling cost.*

Trains of two, three or more cars can be operated for hauling the material, which each car dumps alongside of the track far enough away to insure *ample clearance* for passenger cars. Only one man is required for dumping.

Used by leading city and interurban roads. A money-saver wherever operated. They make more money than passenger cars.

Get in touch with us today concerning the application of these cars to your lines. If you are in the market for *early spring delivery,* let us hear from you at once.

Write for Bulletin.

DIFFERENTIAL CAR COMPANY, INC.

141 Broadway, New York,

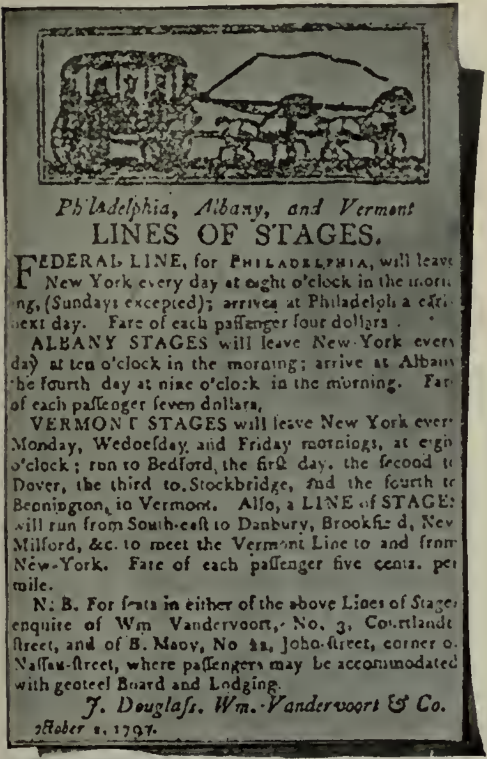
The WHITE *Heavy Duty Truck*

with DOUBLE REDUCTION Gear Drive

Having all the leverage and flexibility of a chain and sprocket and the frictionless driving contact of gears which *roll* in oil, dust proof

Light Unsprung Weight · More Road Clearance
Narrow Tread · High Leverage

THE WHITE COMPANY
Cleveland



Philadelphia, Albany, and Vermont

LINES OF STAGES.

FEDERAL LINE, for PHILADELPHIA, will leave New York every day at eight o'clock in the morning, (Sundays excepted); arrives at Philadelphia early next day. Fare of each paſſenger four dollars.

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N: B. For ſeats in either of the above Lines of Stages enquire of Wm Vandervoort, No. 3, Courtlandt ſtreet, and of B. Maov, No 22, John-ſtreet, corner of Naſſau-ſtreet, where paſſengers may be accommodated with genteel Board and Lodging.

J. Douglaſs. Wm.-Vandervoort & Co.

October 1, 1797.

New York to Albany Three Days— Seven Dollars!

In 1797 Interurban travel was neither as cheap nor as convenient as it is today. One traveled much more slowly and without the present day comforts—in spite of the glowing description in the poster on the left.

In 1786—the first systematic attempt to run stages over the Albany Post Road was made by three Columbia County men who were granted by the state "exclusive right to set up, carry on and drive stage waggons" between New York and Albany on the East side of the Hudson River. Fare limited to four pence per mile. (About $13.00 to Albany)—trips made once a week.

In 1797 the road whose poster appears above was operating in full swing—and made its Albany stage run in three days with daily service and many other improvements, at a fare of seven dollars.

You can see that even in those early days the tendency was to lower fares—to create more comfort—to shorten the time on the road—in fact, to better conditions in every way—just as street railway men do today!

Transportation had its serious problems in the earlier days, even as it does today! Steadily increasing costs had to be met from a steadily diminishing fare—to which, there is only one answer—today or yesterday—namely—a more economical and more efficient operation.

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coupled with Galena Service have served the street railways since their inception—while Galena Oils served the steam railroads before them. In spite of the fact that Galena Oils, were naturally a more economical lubricant—the makers inaugurated Galena Service to make Galena Oils even more economical, and more efficient. Result—100% Satisfaction.

Galena-Signal Oil Co.

Franklin, Pa.

This is just a corner of one of the Erie Works Storerooms where G-E Coils for G-E Motors are stored for immediate shipment.

G-E Coils Are Shipped From Stock

Haste is no excuse for failing to maintain the "original equipment quality" of G-E motors. Coils made for the very motor you have can be shipped on short notice from the centrally located G-E plant at Erie, Pa. These stocks, though moving rapidly, are always maintained complete for the convenience of customers. No coil made is as good for a G-E motor as a G-E coil.

Maintain "Original Equipment Quality"!

General Electric Company

General Office Schenectady, N.Y.

40-38

Electric Railway Journal

Consolidation of STREET RAILWAY JOURNAL and ELECTRIC RAILWAY REVIEW

Volume 53 New York, Saturday, February 1, 1919 *Number* 5

The State Is Supreme in Illinois

THE clean-cut decision of Judge Baldwin of the Circuit Court in Chicago, in the Elevated 6-cent fare case, mentioned in last week's issue, has cleared the atmosphere as far as home rule over public utilities is concerned in that city. It has also set the public to wondering whether they made a mistake in rejecting an ordinance which was voted on last November and was designed to give the people absolute control over the local elevated and surface lines. The decision in question was one denying an injunction to stay the order of the State Public Utilities Commission which granted a 6-cent fare to the elevated roads. In brief, the ruling is to the effect that the city has the power to determine over what streets the roads may operate and to make contracts with the roads, but has not the authority to fix the rate of fares to be charged from time to time. The same position has been taken in other States and is based on the theory that the State has never surrendered its superior police power and that having delegated that power to the Public Utilities Commission the latter body may fix such rates as are just, reasonable and sufficient, regardless of contracts previously entered into between municipalities and operating companies. One of the lawyers summed up the decision by saying that the city has power to make contracts with its utilities but has not the power to enforce them. This ruling if sustained in the higher courts will absolutely remove utility companies in Illinois from the influence of hysterical local clamor when an attempt is made to deny a proper return to capital invested in such corporations. It is added evidence also of a growing recognition of the joint responsibility of the community and the utility for good service by the utility, coupled with a fair return for the service rendered.

Midyear Meeting on March 14

THE midyear meeting and banquet of the American Electric Railway Association will be held in New York on Friday, March 14.

The technical sessions will be held in the Engineering Societies' Building, 29 West Thirty-ninth Street, beginning at 10 a.m. The program follows:

[1]

Report of Committee on Readjustment, P. H. Gadsden, Chairman.

[2]

The State of the Industry

(a) Modern regulatory plans and theories, by an electric railway executive.

(b) Capital and electric railways, by a banker.

(c) From the regulatory viewpoint, by three active or former public utility commissioners.

The annual banquet will be held in the evening at the Waldorf-Astoria Hotel. The general topic of the addresses will be "Rehabilitation."

Skip Stop Does Not Increase Accidents

THE fundamental principles which contribute to economical car operation have been long recognized by electric railway engineers. One of the most important of these is the saving and benefits to be derived from decreasing the number of stops by establishing skip-stop operation. Such operation during the war period has demonstrated its advantages both to the traveling public and to the railways. Where the number of stops is reduced a faster, more comfortable and more frequent service can be maintained without increasing the energy input. These are some of the profits gained by the public. The railway company receives benefits from the decrease in the work placed on the equipment which results in fewer troubles and a decreased maintenance expense. The public in general has failed to appreciate the value of this change in service which was introduced as a war measure and is being continued in many cities now for economical reasons. This lack of confidence no doubt has been caused by the ignorance of the public as to the advantages and to insufficient co-operation between the railway and its passengers. In another part of this issue we give a description of the publicity campaign which has been instituted by the Philadelphia Rapid Transit Company to correct the erroneous impression that the use of the skip stop in that city caused an increase in the number of fatal accidents that occurred on the company's lines. A committee composed of all classes of citizens was asked to hold public hearings and take testimony from all who might wish to present evidence that the skip stop had been responsible for any fatalities. The newspapers which had been instrumental in spreading this false impression were also invited to send representatives and give any information they might have in support of the theory. No newspaper representative appeared, and the committee made a report stating that no evidence had been presented to prove that additional casualties had resulted from skip-stop operation.

This spirit by which a company takes the public into its confidence is to be commended and it is to be hoped that the seed sown in this publicity campaign will take firm root and result in correcting the false impression and assist in creating confidence in the skip stop.

Help Make the Committee Reports as Valuable as Possible

AFTER an intermission of two years, the affiliated associations are again taking up active work and are laying plans for the preparation of committee reports to be presented at the convention next October. The two and one-half years which have elapsed since the last convention was held in 1916, have been the most momentous in the history of the industry. New problems have arisen in practically every branch of the business, and the result is that the number of topics to be considered is actually bewildering. The executive committees of the several associations are now going over carefully this extended list to determine which are the most important, all things considered, to be taken up. Committees will then be appointed.

All of this planning will largely go to waste, however, unless hard work in the way of investigation is put on these topics by the committee appointed to consider them. This is a matter where the responsibility is partly that of the man himself and partly that of the executive of his company. We realize that this is a time when detail problems are pressing at home, and many a chief executive feels that it will be difficult to spare the time of any of his men who may be asked to engage in committee work. But this is not the right way of looking at the matter. The work must be done, and it can be done only through sacrifice and provided each committee man puts into the work the best that is in him. The welfare of the industry as well as of each individual company is at stake.

There are also compensating advantages for the time spent in committee work, both to the man himself and to his employing company. These advantages come from the fact that the committeeman gets in touch with other men selected because of their special knowledge to solve the problem on which they are engaged. Each committeeman cannot but profit by the interchange of information and ideas at committee meetings beyond the data actually embodied in the printed report, and this opportunity is of direct benefit to the company which employs him.

There is therefore every reason to induce the operating companies to co-operate with the associations by permitting their men to engage in committee work. There is special reason this year for the need of co-operation in committee work, partly because of the extent of the problems and partly because of the shortness of time. Usually it has been possible to get committees at work shortly after the annual meeting, or in November or December. This year, on account of the uncertainty, the start has necessarily been delayed some two months. This means that the work must be carried on with more than the usual activity. But with all working in accord, the 1919 convention should be the most valuable in the history of the associations.

Railway Ills Call for Prevention Rather than Cure

THE technical journals of an industry reflect with considerable accuracy the current tone and trend of thought in that industry. By a study of the back files of such journals the development of an industry may be readily traced. In looking over our own files recently it occurred to us that a number of striking changes in viewpoint have taken place in the electric railway industry within the last fifteen years. At the beginning of this period the ELECTRIC RAILWAY JOURNAL, then the STREET RAILWAY JOURNAL, was replete with descriptions of construction work and new roads. Heavy electric traction was in its infancy and the "battle of the systems" was in its "earliest phases." To push construction work ahead and get the wheels rolling was the leading thought. With the passing of the construction period came the necessity of paying dividends, and plans for traffic promotion and for cutting down operating expenses began to receive attention. These are the problems that are still with us.

It is a significant fact, and one that gives some hope as to the future, that whereas plans for affecting savings were much discussed ten years ago they were more in the way of remedial than preventive measures. To illustrate: The trend of discussion in those days with reference to accident claims was more along the line of proper handling of claims and the reducing of the cost per claim than in studying out methods of getting at the root of the evil, namely, the prevention of accidents. The latter phase of the problem is the one which has received the most serious attention these latter days with the result that safety cars, safety devices, and safe operating methods have materially reduced the number of accidents.

The same trend is noticeable in other departments of the industry. It seems to us that this trend is decidedly in the right direction. Remedial medicine may help alleviate the pains of a sick man, but preventive medicine keeps him from getting sick and is therefore the most economical as well as the most logical.

Burdens, grievous ones, have fallen on the industry as a result of the war. But the old saying "'Tis an ill wind that blows no one good" is still true. The war has forced us to get down to bedrock at the roots of our problems in many instances. It has taught us that we can save in many ways that we before had not dreamed possible. It has torn away some of the old traditions that in the past have hampered us. Last but not least, it has burst asunder some of the shackles of public prejudice with which we have been tied down. We have learned that in many instances much can be gained by the application of correct engineering and accounting methods to the diverse problems of the industry. And the field is by no means exhausted. Some of the prominent men in the industry feel that we are only getting a good start in the matter and that the wider application of such methods will yield greater results than an equal amount of endeavor spent along any other line.

Possibilities in the Zone System of Fares

SO MUCH has been said in these columns in favor of more general adoption of the zone system of fare collection that we are pleased to find the authorities giving serious thought to this innovation in many places. The recommendation of Prof. A. S. Richey, mentioned in our issues of Dec. 28 and Jan. 18, for the adoption of a two-zone system on the Boston Elevated Railway property is a case in point. Careful study of some such plan is also progressing in St. Louis and on the system of the Public Service Railway. These investigations, together with the results of experiments in various other cities, are an indication of the way the wind is blowing, and we have no doubt that the current year will find the solution of the fare problem on more than one property in having rates in cities proportioned, to some extent at least, to journey lengths.

It was established by the report of the Boston Joint Commission in 1914 that the maximum length of a profitable haul on the Boston Elevated system was 4.25 miles, without allowing a greater return on investment or allowance for depreciation than were then in effect on that property. Similarly in 1917 Professor Richey reported that the paying haul in the central 5-cent zone of Springfield, Mass., allowing the same return on investment as was then in effect, was about 2.76 miles. From two such careful surveys we may see what a difference there is between the length of profitable haul in two cities. In each case it is shown that a person who rides beyond the distance indicated is getting more than his money's worth. Consideration of the two reports suggests the folly of attempting to establish a standard distance for zone fares applicable to all cities.

Arguments which have been offered for and against a zone system are so well known as to merit no further repetition here. Professor Richey calls attention to many of them in his report. He quotes President McCulloch of the St. Louis company as saying, "every day we are doing things differently from the way they were done last year," and we are all aware of the effect of the great war on long-established habits. The American genius for overcoming obstacles is generally recognized, and if the only thing that stands in the way of making a zone system successful is a practical method of fare collection we may take it for granted that such a method will be found. The one recommended for Boston reads like a workable system, and undoubtedly this plan or some variation from it will yet be put into effective operation.

The Boston car-riding public certainly has had its share of experiment with flat fares of different grades under public trustees who can be charged with no ulterior motives in trying to put local transportation on a paying basis for the good of the community. It is very likely, therefore, that these people will welcome any change which promises a solution of their difficulties without imposing a higher unit fare. It would not be surprising either if another of Professor Richey's suggestions is given a trial—namely, the matter of experimenting with low-fare cars on short routes in congested districts. These routes, as he suggests, should be carefully chosen with a view to connecting points of common interest, the speed to be reasonably fast and headway between cars to be sufficiently short. Any plan that will attract short riders is worthy of serious consideration. Developments in Boston will be watched closely.

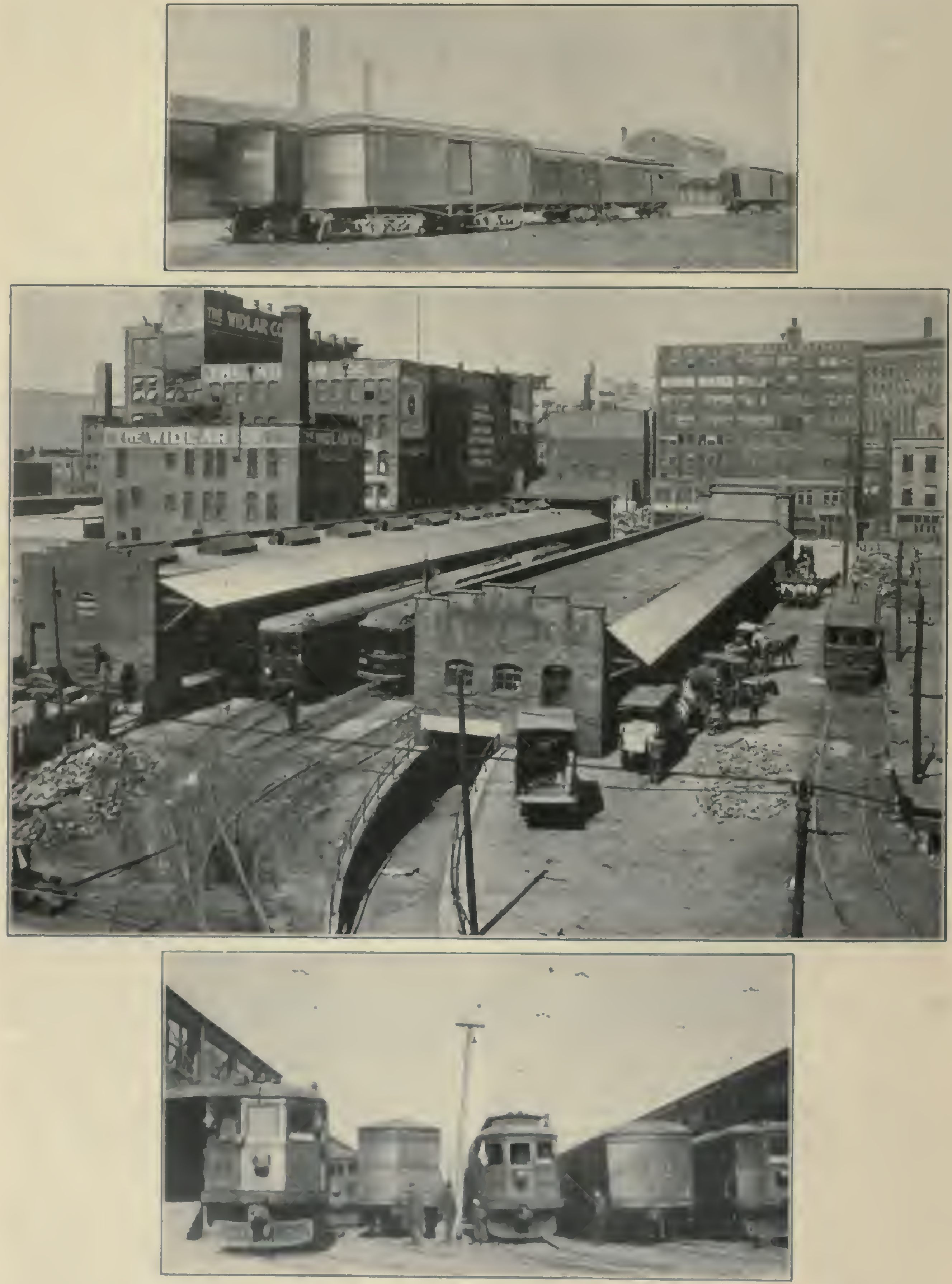
Steam Roads Are Experimenting With Concrete Ballast

WILL the steam railroads ultimately adopt some form of concrete slab ballast or sub-ballast construction for their tracks? This question is raised by the experiments now reported after four years of service test of a form of this general type of construction on the Northern Pacific Railway. The general features of the construction used are described elsewhere in this issue. There has been a growing tendency with steam roads to use concrete in some form in the roadbed for the treatment of troubles incident to ballasted tracks in wet cuts. but we believe the 2000-ft. experimental section of the Northern Pacific Railway to be the most extensive so far undertaken by the steam roads in their endeavors to produce a more stable roadbed and track under the constantly increasing loads.

Several roads have used some form of concrete ballast in tunnel construction and at terminals with satisfactory results, and the newer subway tracks in New York City are usually built in a similar manner at stations, but in these instances the reasons for its use have been mainly for cleanliness and to simplify maintenance problems which tunnel construction presents. It is particularly difficult to renew standard ties within the close limits of subway and tunnel walls. The boldness of the experimental use of concrete for open main-line track will be appreciated as a radical departure from accepted steam road practice.

Meanwhile electric railways, particularly in street construction, have been using concrete ballast in two principal forms, one wherein the ties are embedded in concrete and the other where the ties are laid upon several inches of ballast which in turn is laid upon a concrete slab sub-ballast. The latter is gaining in favor where conditions warrant the expense. It is interesting, therefore, to note the tendency of the steam roads, in their struggle with the roadbed and ballast question, toward the adoption of a form of construction which electric railways have found quite successful in application to electric railway conditions. Another feature worth noting is the report that the continuous wooden stringer type of construction has given the best service of the three types of construction under test. It leads us back to the old horse-car and early electric railway days, when the wood stringer was used almost universally to support the rails.

The experiments in question will be followed with great interest, not only by steam road engineers but also by those interested in electric railways, particularly because it is reported that the new types of construction have so far been maintained for about 5 per cent of the maintenance cost of adjacent tracks of regular ballasted construction, on the same line, under the same traffic and built at the same time. It would seem that such a saving in maintenance will justify the added cost for the new construction, although we have no information as to the cost, which must have been at least three or four times as great as regular ballasted track.



Electric Railway Freight Terminals

At top, carload freight of the Terre Haute, Indianapolis & Eastern Traction Company, at Indianapolis, Ind. In center, Electric Package Express Company, Cleveland, Ohio. At bottom, house tracks of the Detroit (Mich.) United Railway.

What Freight Handling on Electric Roads Requires and Costs

Electric Railways Have a Drastic Need of Adequate Freight Terminals, and Mechanical Freight-Handling Devices Should Supplant Brute-Power Devices in the Interest of Scientific and Economical Management—Valuable Operating Data Are Given for Electric and Steam Line Freight Houses

By A. B. Cole

Westinghouse Electric & Manufacturing Company

Preceding articles by Mr. Cole on the subject of electric railway freight service were published in the ELECTRIC RAILWAY JOURNAL of May 11, 1918, and Jan. 4, 1919.

TO GIVE man-size freight service upon electric railways, proper station buildings, track layouts and other facilities must be provided. Moreover, in many instances it is necessary for the company to assist in locating grain elevators, coal yards, lumber yards, stock yards, and loading chutes. Each station site should include a plot of land, say 300 ft. x 2000 ft., to permit the offering of attractive long-term leases for grain elevators and the like.

The standard station building of one progressive road is a brick, concrete and steel structure, 101 ft. x 22 ft. As nearly all passenger stations on this line are combined with an electrical substation, the building is divided into four parts. The substation equipment occupies 30 ft. 6 in. of length at one end of the building; the ticket office comes next with a length of 12 ft. and extends across the width of the building; then there is a waiting room 16 ft. long, leaving a freight room of 36 ft. long to occupy the other end of the building. At some way stations, where the traffic demands it, stock yards of six pen capacity, hog showers, and grain elevators will be found.

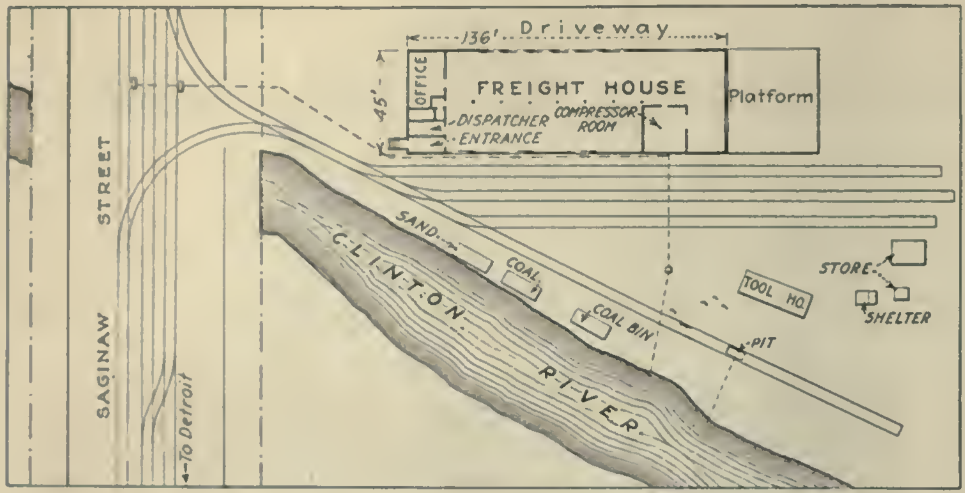
Of paramount importance is the length of sidings. Passing sidings are as long as 2000 ft., while the minimum length of an industrial track is 1000 ft. With the latter there is sufficient room for industries along such a track to make it pay in time, while a long passing track adds considerably to the flexibility of freight handling on a single track line with large passenger business. Once a freight train is on the passing track, it can do all its work without blocking the main line.

One road, when projecting its line had enough foresight to buy, in all towns, sufficient land to draw many industries next to the railroad. In other words, all industries with track facilities are on land leased from the electric line. This advantageous location of industries pleases both the shipper and the railway.

These are important phases of freight-handling in its more advanced stages. As stated in preceding articles, such complete facilities are not required for electric railways to start the haulage of freight, but they constitute the means needed for extended development later. At present, however, some lines that are old at the business of carrying freight have not developed their facilities sufficiently about this line to answer present needs, let alone future requirements. In fact, it must be obvious that freight haulage could be considerably improved if interurban electric railways had something better than defunct store buildings, livery stables and barns—the class of buildings in which most of such companies cradle their freight business. Perhaps this condition is due to lack of money, but it must none the less be regarded as a detriment to the interurbans through the prevention of the efficient handling of freight.

Furthermore, labor-saving devices for handling freight are practically non-existent. In electric railway freight houses a large amount of freight for a certain shipper or group of shippers may be found piled around numbered posts. Since electric railway freight service is largely of a dispatch nature, it would be far better if managements would look into labor-saving devices instead of copying practices that led Mr. Brandeis, now judge of the United States Supreme Court, to accuse the steam railroads of wasting $1,000,000 a day. Most electric railways have power houses, substations and car shops where they use power hoists, jib cranes and traveling cranes, as a matter of course—even in power houses and substations where they are rarely needed. Yet there is practically no freight house—either steam or electric—in this country that has a traveling crane!

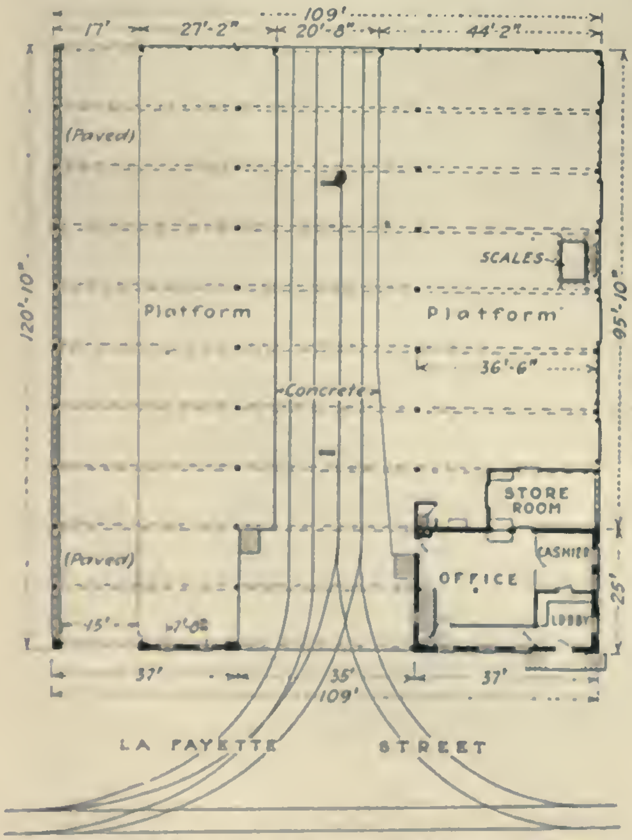
Labor-saving devices for moving material have been extensively adopted by practically all the large industrial plants in the country. Surely in these days the use of brute-power devices like two-wheel and four-wheel trucks is entirely out of harmony with the modern idea of speed in the loading, unloading and storing of freight, and of scientific, economical management in general.



TYPICAL FREIGHT STATION LAYOUT, DETROIT UNITED RAILWAY, PONTIAC, MICH.

Moreover, work is too often not made as easy for teamsters as it should be. A satisfied customer is any company's best advertisement. Since in freight handling the teamster is often the point of intimate contact between the railway and the shipper, it is of paramount importance that the teamster be kept in the best of humor. To this end he must be supplied with facilities which will assist him in delivering his loads, receiving them and getting away from the freight house with the least loss of time.

One of the first things that should always be considered in laying out a team driveway and team yard is the provision of proper paving. A road in a muddy and rough condition is always a trial to the temper of the teamster. He may experience some difficulty on this seemingly small point and complain that it is hard to get shipments into the electric line warehouse without serious delays. As a result his employer may finally decide to ship via some competing line that provides better facilities. This situation may seem far-fetched, but the point covered is not uncommon and should receive consideration. In handling freight, there are several types of houses peculiar to certain classes of traffic. These freight houses divide themselves as follows: l. c. l., trap and transfer. In practically every case, however, provision is made to handle inbound as well as outbound freight. The most extensive layouts provide for the handling of two classes of freight in separate structures. This arrangement greatly facilitates the flexible handling of cars and also expedites the service for the shipper.



FIRST-FLOOR PLAN OF L. C. L. FREIGHT HOUSE OF NEW YORK STATE RAILWAYS, UTICA LINES

Most interurban lines have heretofore made a specialty of less-than-carload freight. By virtue of its nature, such freight seems to be easily adapted to interurban conditions. In many cases the freight business grew up solely through service that was more or less comparable with express. Ultimately it grew so that large quantities of merchandise for various points along the line had to be handled in separate motor-freight cars, and these motor cars, in turn, were sometimes compelled to handle trailers.

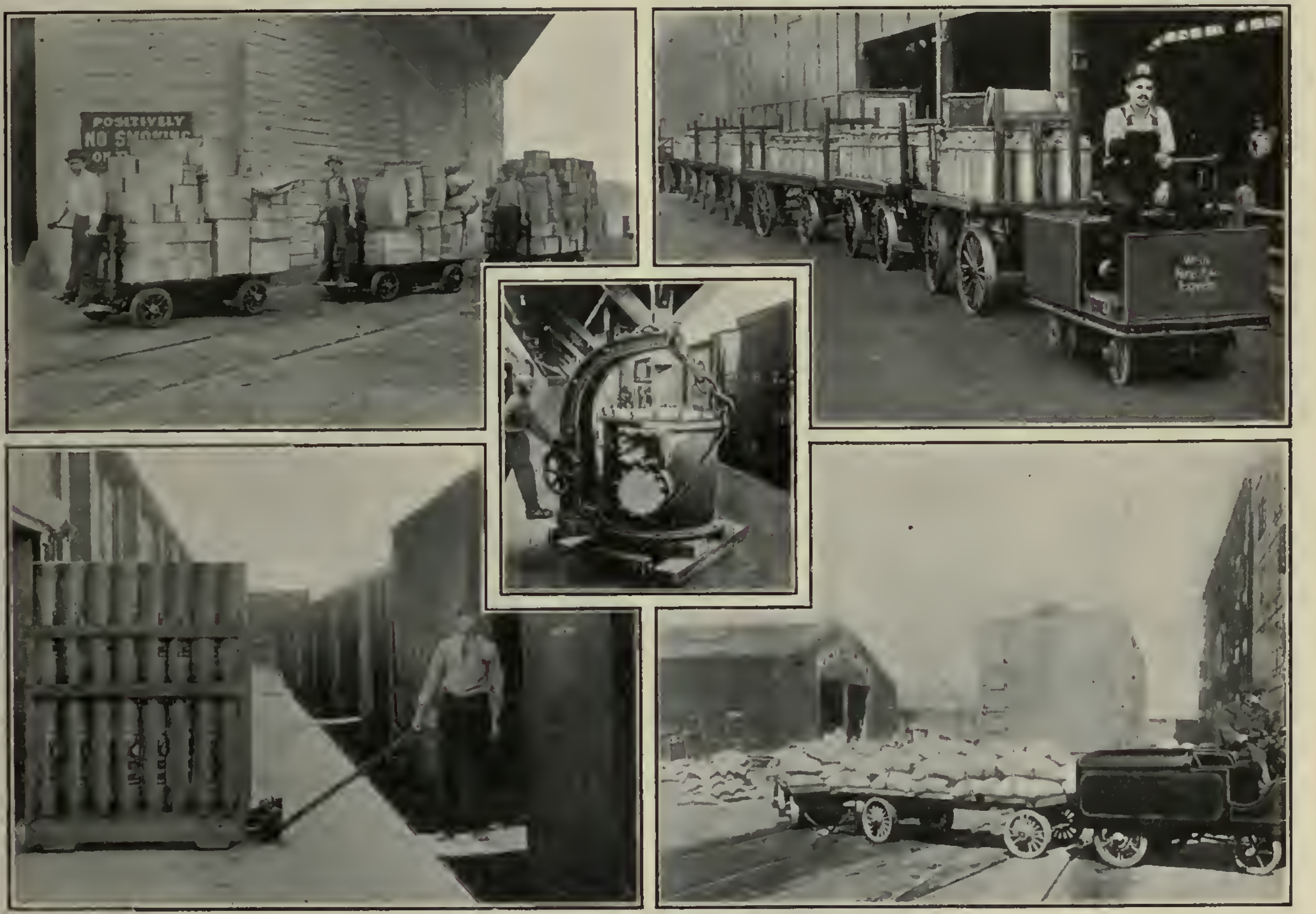
As the electric railways extend their freight facilities from now on, they should handle much more carload freight. Carload freight shipments do not necessarily pass through a freight house; they may be loaded from the team track in the freight yard of the electric line or at the industry where the freight originates, the car in turn being switched to the main line.

Under present conditions, however, interurban freight traffic is of such a character that the freight houses usually come under the first classification—the l. c. l. type. The building used is generally a low one with a driveway on one side and with a house track on the other. This track may extend beyond the platform, giving capacity for one or two cars to be loaded or unloaded by team. Often, however, one finds freight houses with the team track on the same side as the team driveway. Moreover, there are many instances where the public streets are used as the driveway. The daily carhouse capacity varies considerably, from one, two or three cars to sometimes a hundred, as in the case of the Detroit and Indianapolis terminals.

ECONOMICAL HANDLING OF L. C. L. FREIGHT

The problem of handling l. c. l. freight properly—*i. e.*, with regularity, efficiency and economy—is of vital importance. While the transporting of merchandise freight is in itself an expensive service and while the savings from the use of freight-house mechanical equipment are, to speak broadly, small in comparison with the total cost of operation, still it is highly important that all possible handling facilities be provided that are commensurate with the traffic furnished and the revenue received.

The necessity for the relief of congestion is in itself a powerful argument for the proper use of freight-handling devices. The congestion may arise from special causes or it may be the result of the gradual growth of traffic, l.c.l. business having been found to double in volume every fifteen years. All congestion means increased costs, and in numerous cases this factor has run the operating costs to a high figure. Conditions of congestion in many electric railway freight terminals would be considerably relieved through the use of certain mechanical devices.


HOW FREIGHT HANDLING IS MADE EASY

The subject requires study in each particular case, of course, for most electric railway freight terminals are not so extensive as steam ones, and all the factors of cost should be considered before an electric line determines how far to go in regard to using mechanical devices. In general, however, it may be said that the four-wheel auto truck seems to be the unit which would largely help electric lines to solve the problems of freight handling.

Both steam and electric men seem to have the erroneous impression that the well-known two-wheel type of truck is the most practical unit for freight handling. In recent exhaustive investigations, however, it has been proved that the four-wheel auto truck merits first consideration. That an appreciable reduction in cost per ton is possible, is accepted by many of the best engineers studying this particular problem. With a four-wheel auto truck one man can move from 2000 to 3000 lb. as compared to an average of 400 to 600 lb. on a two-wheel truck. The most up-to-date freight stations almost invariably have the four-wheel type of freight-handling rolling stock, and its use is very essential to the successful operation of the l. c. l. type of freight house.

The automobile industrial truck, which is equipped with a storage battery and propelled by electric motor, has been in common use in many manufacturers' warehouses. Being what might properly be called an electric tractor, it can in many cases be used with trailers of the four-wheel type, which save a large amount of time, labor and expense.

One form of this truck has a platform which can be lowered to pick up a loaded multiple platform. The multiple platform is built in the form of a sled, without steel runners, and it is only used as a vehicle for quickly loading and unloading a given amount of freight. The truck platform, having an adjustable height, can be run under a multiple platform, and the latter can be picked up and hauled to any point in the warehouse. This would seem a most logical device for electric railways generally.

In addition to inside facilities, better unloading arrangements should be provided in the yards for heavy tonnage freight which requires team-track unloading.

GRAIN ELEVATORS ARE CLOSE BY ON THE TOLEDO & WESTERN RAILROAD

Some steam railroads provide a derrick, and others a bridge which extends over the cars and part of the driveway. This bridge has a traveling hoist so that large pieces of freight can easily be lifted from the car into the shipper's truck

In the mechanical handling of any freight, one point must be borne in mind, *i. e.*, the impossibility of keeping down the cost per ton unless close supervision is provided. The maximum economy to be obtained is only possible when freight from starting point to destination is kept on the same set of wheels. This is a fundamental in the mechanical handling of freight.

Transfer freight houses of electric railways are generally employed for the transfer of freight collected by trap cars, or for the distribution of interline l. c. l. freight.

Trap-car operation means that certain industries are supplied with one or more empty small cars each day, as the occasion demands, it being understood that the shipments will be less-than-carload. The trap cars are picked up at specified times during the day and taken to the transfer freight house. Here the freight for certain destinations is assembled in carload lots to secure efficient loading.

The use of trap cars not only increases the capacity of the warehouse but also makes possible the more efficient handling of l. c. l. freight. The steam-railroad way of handling this class of freight with regulation cars is very inefficient, as cases are known where the daily load of l. c. l. freight is not more than 400 to 500 lb. The trap car, however, is built to carry a small tonnage, and when it is held for l. c. l. service the unused capacity is minimized.

How a line can extend its freight-handling facilities through the use of trap cars is shown by the experience of the Waterloo, Cedar Falls & Northern Railway. This company operates a 7½-mile freight belt line which, as shown by the map on page 225, extends around the factory district of both east and west Waterloo, and ties together all steam lines entering Waterloo.

The company has two trap cars, each comprising a flat car with cab equipped with four 40-hp. motors. These cars call regularly on the manufacturers of Waterloo to secure the smaller freight shipments, which are conveyed to the East Waterloo terminal freight house, for mixed or l. c. l. shipments.

The trap-car service includes calling at the East Waterloo freight house of the Chicago Great Western Railroad and the office of the American Express Company for l. c. l. and express shipments respectively. These last two points are reached by a track on city streets and are used by the trap cars only.

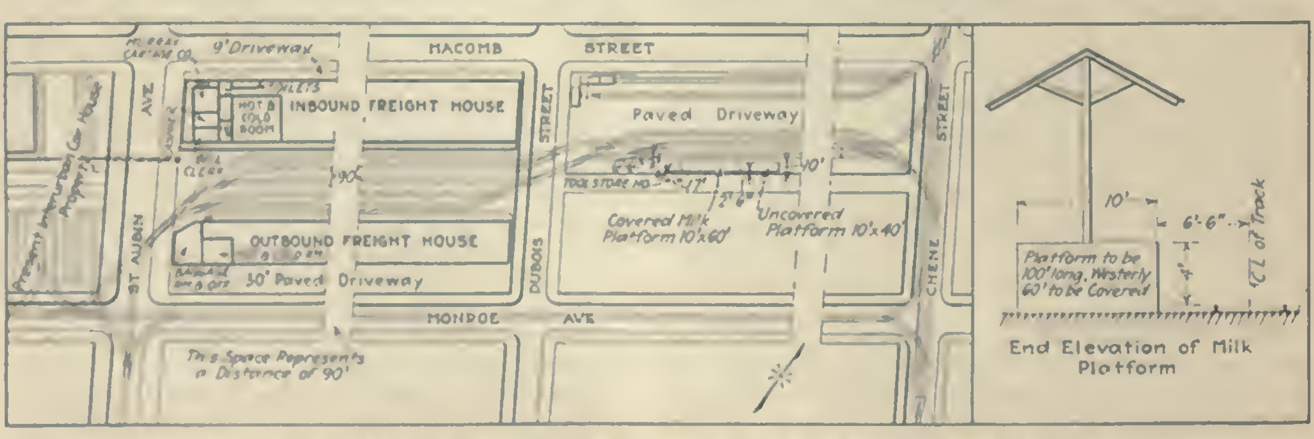
Trap-car service makes it possible for the Cedar Valley road to provide the manufacturing interests of Waterloo with one of the highest class and most efficient freight services that could be desired for both carload and l. c. l. shipments.

HANDLING A HEAVY FREIGHT BUSINESS IN DETROIT

The value of modern freight-terminal facilities is clearly shown in the case of the Detroit (Mich.) United Railway. This company has been able practically to triple its freight-handling capacity by placing in use a spacious new freight terminal. This has materially reduced the cost of handling freight and provided accommodations for the greatly increased business of the company.

The Detroit United Railway was formerly much limited in freight-handling facilities at its main source of business, Detroit. Conditions at the old terminal necessitated considerable rehandling of goods in effecting deliveries—a condition found in many electric freight houses. Embargoes had to be declared often to give the railway a chance to clean up, and new means for conducting the business were found imperative.

The new terminal site is located 1 mile east of the Detroit City Hall, a location which necessitates for the present a long haul by shippers of the west side. The company also has on the west side a large new freight



LAYOUT OF EAST-SIDE FREIGHT TERMINAL ON THE DETROIT UNITED RAILWAY building, 100 ft. longer than the east side one and representing one-half of the pending west-side terminal development. Unfortunately the company has been prevented by existing war conditions from securing the materials for the completion of the west-side terminal, and the building that is finished is leased as a garage. When the whole west side terminal is built and added to the east-side development the Detroit United Railway will be in an enviable position from the standpoint of electric railway freight handling, as its facilities will in many ways be commensurate with those of steam roads.

But already, as said before, the company's freight-handling capacity has been increased threefold by the east-side terminal, and a description of the facilities used to effect this result may be of interest. Previous notes in regard to this terminal were published in the ELECTRIC RAILWAY JOURNAL of April 12 and Aug. 11, 1917, but a brief resurvey will be made here. It is noteworthy that such an extensive terminal could be developed so near the center of the city.

The outbound freight house of the east side terminal, shown in an accompanying diagram, is 45 ft. x 405 ft., and the inbound 60 ft. x 405 ft. Between these two buildings is a yard, consisting of five loading or house tracks. The streets along the outer sides of the freight houses serve as a team and truck way to the station. The buildings and house tracks occupy a complete city block, and in the block beyond are storage tracks for loading and unloading carload shipments. These include four team and storage tracks 600 ft. long, connecting between the two buildings, and also the main line.

The outbound freight house is built two bays wide, with practically continuous doors on the track side and with pairs of doors spaced 35 ft. on the receiving or team side. These are wooden and counter-balanced so that they can be lifted easily. At the far end of the outbound building a chain hoist, for heavy shipments, is mounted on a monorail across the building. The end bay of this building is used by the American Express Company, and at the opposite end the regular baggage room is located in a space 30 ft. x 45 ft. Here a 1000-lb. automatic scale is installed. The company does not handle any baggage on its passenger trains; all baggage is delivered to the outbound freight house and is loaded into express cars.

The inbound freight house, which is 15 ft. wider than the outbound freight house, is in practically all other respects a duplicate of the outbound building. It is also equipped with a monorail hoisting system, opposite that in the outbound freight house. Two automatic 4000 lb. scales are conveniently located for checking.

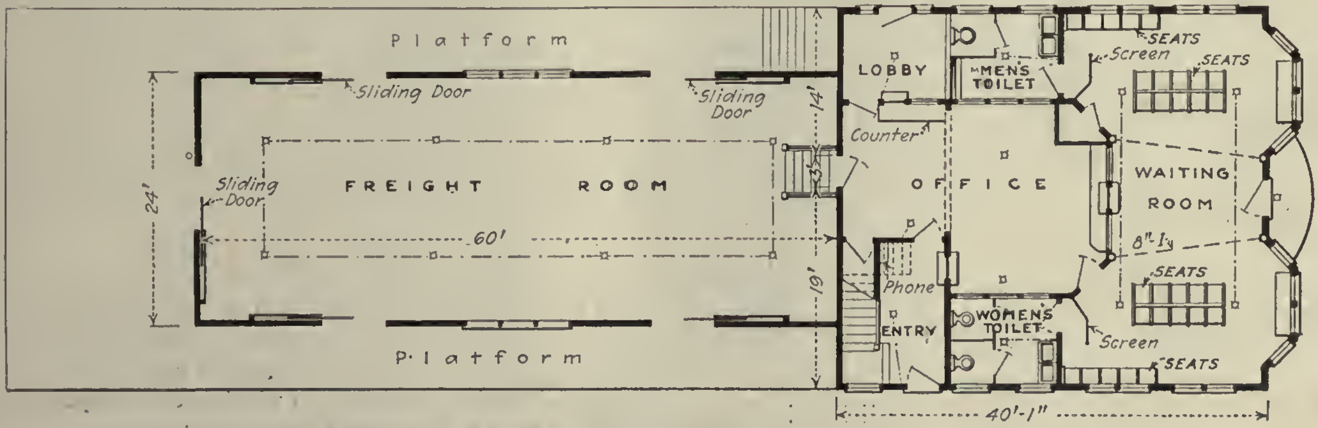
TRAP CAR OF THE WATERLOO, CEDAR FALLS & NORTHERN RAILWAY

The front end of the inbound freight house is two stories high and is utilized for offices. The cashier's office, which is on the first floor with that of the cartage company, has facilities for handling a large volume of work. On the first floor also are the bill clerks and freight-house foreman with clerks working in the cashier's office. The general freight office is located on the second floor, and the local freight agent has there a private office.

On the average eighty to 100 cars a day are landed out of the east-side terminal of the Detroit United Railway, thus making approximately 2000 to 2200 cars per month. This compares favorably with the record of many a steam line terminal. It must be remembered, too, that each electric motor car is equivalent in service to from three to five steam railroad cars. When the electric cars go out they quickly discharge their loads and are readily available for new business.

CEDAR VALLEY LINE HAS INTERESTING TERMINAL

Another terminal to which attention may be directed is that of the Waterloo, Cedar Falls & Northern Railway, located only a short distance from the principal business district of Waterloo, Ia. The freight house and yard tracks are on on a 32-acre site near the Cedar River. The freight house is a one-story brick structure



PLAN OF WAY STATION OF THE DETROIT UNITED RAILWAY AT IMLAY CITY, MICH.

TABLE I—COST OF HANDLING FREIGHT AT COLUMBUS FREIGHT HOUSE OF OHIO ELECTRIC RAILWAY*

Month, 1918	Tonnage Handled by Pounds	Total Revenue	Average Revenue Per Ton	Depot Labor Expenses	Cost per Ton to Handle
January	5,475,834	$11,194 03	$3.28	$895.00	32 cents
February	6,579,698	12,090.76	3.76	1,055.00	32 cents
March	7,543,619	16,320.57	2.70	1,057.46	28 cents

* Tonnage handled includes only freight originating at and destined to Columbus, and does not include freight transferred.

ACTUAL PAYROLL FOR COLUMBUS FREIGHT HOUSE IN MARCH, 1918

Agent	$85 00
Chief clerk	75.00
Cashier	65 00
Bill clerk	65.00
Bill clerk	40.00
Delivery clerk	65.00
Utility clerk	70.00
Abstract clerk	41 94
Day foreman at 24 cents per hour	72.72
Night foreman at 22½ cents per hour	71.55
One freight handler at 22½ cents per hour	66.45
Six freight handlers at 20 cents per hour	339.80
Total	$1,057.46

TABLE II—FREIGHT-HOUSE DATA OF NORFOLK & WESTERN RAILWAY AT COLUMBUS, OHIO

	Cents per Ton
Operating cost, March, 1918	32.1
Outbound Freight House:	
Receiving	1.5
Trucking	26 7
Delivery (loading check clerks)	4 6
Stowing	3 1
Supervision, Miscellaneous } Overhead	0.9
Total cost	36.8
Inbound Freight House:	
Receiving (unloading check clerks)	4 8
Trucking	12.5
Delivery (connecting line traffic and city)	4 3
Stowing (outbound trip cars)	1 3
Supervision, Miscellaneous }	0 9
Total cost	23.8

GENERAL DATA ON FREIGHT HOUSES USED

	*Outbound	*Inbound
Actual length (feet)	480	300
Width (feet)	47	36
Length used (feet)	450	280
Number of house tracks	3	2
Number of team tracks	3	7
Width of driveway (feet)	30	25
Driveway frontage (feet)	800	700
†Cars per day (average)	52	45
†Cars per month (average)	1,300	1,125
†Cars per year	15,600	13,500

* Separate inbound and outbound stations, located one city block apart.
† Includes team-track cars.

L. C. L. MERCHANDISE CARS PER YEAR:

	1913	1914	1915	1916	1917
January	1,379	1,311	1,142	1,370	1,630
February	1,367	1,387	1,192	1,431	1,470
March	1,680	1,497	1,496	1,722	1,823
April	1,347	1,545	1,470	1,598	1,792
May	1,598	1,437	1,444	1,667	1,821
June	1,544	1,474	1,457	1,623	1,779
July	1,490	1,476	1,423	1,601	1,624
August	1,489	1,547	1,465	1,698	1,617
September	1,605	1,574	1,375	1,776	1,595
October	1,785	1,499	1,656	1,845	1,802
November	1,382	1,391	1,623	1,810	1,633
December	1,305	1,226	1,568	1,729	1,312

	Inbound	Outbound
L.c.l. car-standing capacity at freight warehouses	15	48
Ratio of cars per day to car capacity (per cent)	187	100
Driveway frontage per car capacity	37	10
Platform (floor) area (square feet)	10,080	19,000
Platform (floor) area per car capacity	272	396
Trucking distance from receiving door to car and return (feet)	40	100

NOTE—Approximately 80 per cent of l.c.l. tonnage handled is in transfer to or from connecting line stations.

	Inbound	Outbound
Value of land per square foot (estimate in cents)	80	.....

Scales:

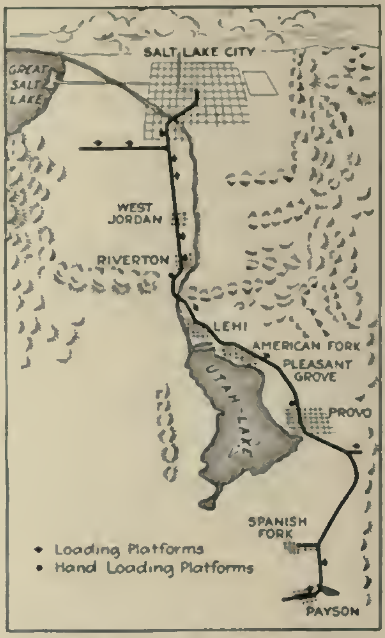
Type and Make	Number	Individual Capacity
Fairbanks, warehouse	5	10,000 lb.
Fairbanks, wagon	1	20,000 lb.
Kron, automatic dial	1	2,500 lb.
Toledo, automatic dial	1	2,500 lb.

Trucks:

Type and Make	Number
Reynolds four-wheel, hand	8
Wooden two-wheel, hand	54

Elevators: None

having a two-story office end with basement. The roof is tar and gravel composition, laid on steel trestles and purlins. The foundation is of concrete and for part of the way is carried down 20 ft. to bed-rock. On the team side of the building there are five sliding steel doors, of sufficient width to accommodate two teams. The track side is composed entirely of rolling steel doors, eighteen in all. These doors are so arranged that it is possible to run in a string of empty cars to the house track without "spotting" them, so that the car and freight house doors will be exactly opposite, a procedure which is not always easy or convenient. By this arrangement the freight house can be opened up to a car wherever it may be on the track.



LOADING STATIONS FOR SUGAR BEET FACTORIES ON THE SALT LAKE & UTAH RAILWAY

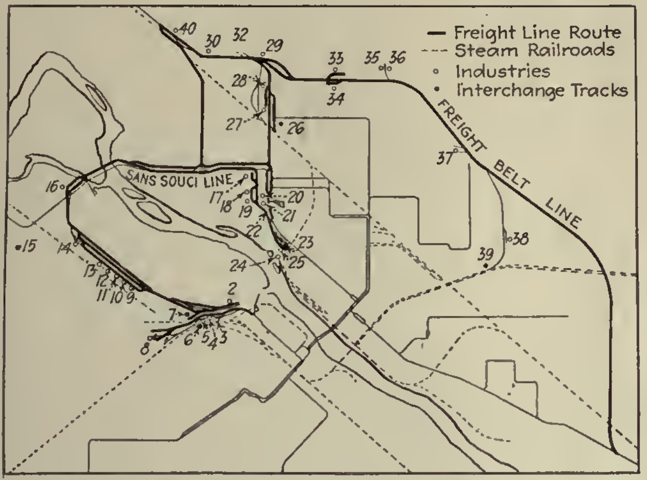
On the team side, there is a wide, wooden canopy covered with Barret specification roofing and fastened by heavy rods to the building columns. On each side of the building above the doors extends a row of windows, so that the interior is excellently lighted. Two Fairbanks dial scales of 4-ton capacity each and with a hard maple floor are used.

For taking care of its large amount of perishable freight the company has built in one corner of the freight house an insulated storage room about 17 ft. square. The walls of this compartment, which are 10 ft. high, are made from 19 in. of plain brick and 4 in. of cork with a cement plaster lining on the inside.

The two-story portion, which is trimmed in cut limestone, houses a freight office on the first floor, and on the second, offices for the line superintendent and roadmaster and despatcher. The floors in this part are of reinforced concrete. In the basement are located the boiler room, the coal storage and the fireproof vault (15 ft. x 20 ft.) The heating plant consists of a tubular boiler of sufficient capacity to heat the offices, the warming room and five standard road cars in the yard. Three tracks extend into the freight yard. Five cars can be "spotted" at the freight house per track; or by trucking through the cars, fifteen cars can be loaded at one time.

FREIGHT HOUSE OPERATING DATA

So much for the physical side of freight-handling facilities; let the attention now be turned to their accounting aspects. What does it cost to operate freight houses? This is a subject upon which every prospective freight-carrying line should put serious study.



INTERCHANGES, INDUSTRIES AND STEAM RAILROADS ALONG CEDAR VALLEY BELT LINE IN WATERLOO
(See table at right for numbered key to industries)

KEY TO INDUSTRIES ON WATERLOO BELT LINE

1—Cream separator plant
2—Gasoline engine plant
3—Wholesale oil
4—Furnace manufacturing plant
5—Ford assembling plant
6—C. R. I. & P. Ry. interchange
7—Chicago & Gt. Western interchange
8—W. C. F. & N. Ry. power station
9—Tractor plant
10—Meat packing plant
11—Agricultural plant
12—Foundry
13—Machine shop
14—Seed house
15—Motor truck plant
16—Dairy cattle congress
17—Bedding manufacturing plant
18—Warehouse
19—Chemical works
20—Structural steel plant
21—Fabrication plant
22—Coal yard
23—Manufacturing plant
24—Waterloo lighting station
25—Farm wagon plant
26—Illinois Central interchange
27—Farm wagon plant
28—Foundry
29—Junk yard
30—Stock yards
32—Paving manufacturing plant
33—Wholesale oil plant
34—Tank and silo plant
35— } Engine tractor plants
36— }
37—Farm tools manufacturing plant
38—Asphalt paving plant
39—Chicago & Gt. Western interchange
40—Stone crusher

In general, in order to arrive at the operating costs of a freight house, it is necessary to consider the following items: receiving, trucking, stowing, delivery, supervision and miscellaneous. These last two items are called over-head. Moreover, consideration must be given to certain facilities of paramount importance which should be provided in sufficient capacity to handle the business offered. These are: platform area, platform furnished for teams, car standing capacity (including suitable lead or approach tracks) and team driveways.

Investment per car capacity varies considerably with the locality of the freight house, ranging from $4000 to $42,000 for single-level freight houses where the land runs from $1 to $20 per square foot. In freight houses of the one-level type, there is usually an allowance of 2000 sq.ft. per car. In the case of the double-deck freight houses, the cost is found to vary from $5,000 to $24,000 per car capacity where the land ranges in value

TABLE III—FREIGHT HOUSE DATA FOR CHICAGO, ROCK ISLAND & PACIFIC RAILWAY AT FORT WORTH, TEX.

	Cents per Ton
Operating cost†	3889
Receiving	2.43
Trucking	17.04
Delivery	*
Stowing	4.02
Supervision	3.59
Miscellaneous (overhead)	6.52
Callers	3.90
Sealer	1.39
Total cost	38.89

† Inbound and outbound freight in one house.
* Included under "Receiving."

GENERAL DATA ON FREIGHT HOUSES USED

Actual length (feet)	245
Width (feet)	30
Length used (feet)	245
Number of house tracks	5
Width of driveway (feet)	35
Driveway frontage (feet)	500
Tonnage per month	2,907
Cars per day (average)	10
Cars per month (average)	362
Cars per year (average for past five years)	4,444

CARS PER YEAR

	1913	1914	1915	1916	1917
January	559	581	339	354	297
February	464	503	339	348	273
March	496	554	365	340	314
April	530	463	338	304	247
May	527	405	315	333	203
June	492	376	308	303	207
July	425	448	319	301	207
August	493	351	314	309	197
September	493	378	298	273	174
October	564	413	300	295	202
November	527	378	322	283	199
December	577	415	348	270	223

Car-standing capacity, including suitable lead and approach tracks	64
Driveway frontage per car apacity	14
Platform (floor) area (square feet)	17,650
Maximum trucking distance from receiving door to car and return (feet)	614

Scales:

Type and Make	Number
Dormant Fairbanks	3
Portable Fairbanks	1

Trucks:

Type and Make	Number
Hercules two-wheel (steel)	24
Reynolds four-wheel (wood)	5
Reynolds two-wheel (wood)	8
American two-wheel (steel)	31

Other power labor-saving devices: three dollies, two lifts.
Elevators: None.

TABLE IV—DATA FOR LOS ANGELES FREIGHT HOUSE OF PACIFIC ELECTRIC RAILWAY
OPERATING COST

Outbound and Inbound Freight Houses:	Cents per Ton
Receiving Trucking Delivery Stowing	Cost of handling not segregated. Average cost of both inbound and outbound 52 cents per ton. *52
Supervision Miscellaneous } overhead	3
Total cost	55

* Cost of handling not segregated. Average cost for both inbound and outbound is as stated.

GENERAL DATA ON FREIGHT HOUSES USED

	1918	
	Inbound	Outbound
Actual length (feet)	350	580
Width (feet)	55	55
Length used (feet)	350	580
Number of house tracks	2	3
Number of team tracks	3	1
Width of driveway (feet)	56	56
Driveway frontage (feet)	28	28
Tonnage per month	.....	*12,600
Cars per day (average)	22	32
Cars per month (average)	600	800
Cars per year	7,200	9,600

* For both inbound and outbound houses.

CARS PER YEAR

	1913	1914	1915	1916	1917
January	950	960	950	970	980
February	870	900	910	900	920
March	960	980	990	985	990
April	940	965	970	975	980
May	890	900	900	910	925
June	900	945	950	955	960
July	940	960	975	980	990
August	955	970	980	985	1000
September	930	960	965	970	1050
October	975	990	995	990	1060
November	980	980	985	990	1050
December	1000	990	1000	1010	1100

Car-standing capacity, including suitable lead and approach tracks	81
Ratio of cars per day to car capacity (per cent)	70
Platform (floor) area (square feet)	47,850
Platform (floor) area per car capacity	590
Trucking distance from receiving door to car and return (feet)	280

Value of land per square foot. Land in this vicinity has recently been appraised at $3.10 per square foot.

Scales:

Type and Make	Capacity
Fairbanks Platform, No. 12	2 tons
Fairbanks Wagon, No. 1	20 tons

Trucks:
Type and Make, Two-Wheel
Hand Trucks, 300
Four-Wheel
Dollies, 5.
Elevators: None.

TABLE V—INBOUND TONNAGE AND COST OF HANDLING AT ST. LOUIS FREIGHT HOUSE OF M. K. & T. RY. ON MARCH 30, 1918

No.	Occupation	Days	Hours	Rate	Amount			Pounds
1	Verification	1	0	$75 00	$2 88			
0	Receiving and loading clerks	0	0	.00	00			
5	Unloading and transfer clerks	4	5	75 00	12 96			
0	Routing clerks	0	0	00	00	Inbound cars (M. K. & T.)	7	111,973
5	Delivery clerks	5	0	75 00	14 40	Cooler cars	0	0
5	Delivery clerks	5	0	70.00	13.45	Inbound cars (T. St. L. & W.)	20	435,426
16	Total	15	5	... ...	$43.69	Total	27	547,399
	Handling:							
0	General foreman	0	. . .	.	00	Average per car transferred	0	20,026
1	1st ass't foreman	1	....	$85 00	$3. 26			
1	2nd ass't foreman	1	....	80.00	3.07	Inbound shipments delivered	97	(M. K. & T.)
10	Pickers		100	.235	23.50		270	(T. St. L. & W.)
0	Stowers		0	.....	00			
32	Truckers		320	.22½	72.00	Reported for work	7	(a.m.)
1	Coopers		10	.24½	2.45	Hours relieved	6	(p.m.)
	Current	.	..	.01½	4.11	Hours on duty	10	....
45	Total	2	430	....	$108.39			
61	Grand total	...	....	....	$152 08			

Total tons handled inbound, 274. Inbound cost of handling per ton (cents), 55.50.

TABLE VI—OUTBOUND TONNAGE AND COST OF HANDLING AT ST. LOUIS FREIGHT HOUSE OF M. K. & T. RY. ON MARCH 30, 1918

No.	Occupation	Days	Hours	Rate	Amount			Pounds
0	Verification	0	0	$75.00	$0.00			
6	Receiving and loading clerks	6	0	75 00	17 28			
3	Unloading abd transfer clerks	2	5	75.00	7.76	Outbound cars (T. St. L. & W.)	6	116,600
1	Routing clerks	1	0	75.00	2.88	Outbound cars (M. K. & T.)	34	769,785
1	Car sealer	1	0	60.00	2 30	Cooler cars	0	0
4	Delivery clerks	4	0	70.00	10.76	Inbound cars	0	0
15	Total	14	5	....	$40.98	Total	40	886,385
						Average per car	..	22,640
	Handling:							
1	General foreman	1	0	$115 00	$4 42	Cars transferred	10	....
0	1st ass't foreman	0	0	......	00			
0	2nd ass't foreman	0	0	....	00	Cars delivered in yard	1	(M. K. & T.)
9	Pickers		90	.23½	21.15		5	(T. St. L. & W.)
5	Stowers		50	.24½	12.25	Cars loaded in yards	2	(M. K. & T.)
34	Truckers		335	.22½	75.37		2	(T. St. L. & W.)
1	Coopers	.	10	.24½	2.45	Reported for work	7	(a.m.)
						Hours relieved	6	(p.m.)
50	Total	1	485	....	$115 64	Hours on duty	10	....
65	Grand total	....	...	.	$156.62			
	Total tons handled outbound	443	Cost		$156.62	Outbound cost of handling per ton (cents)	..	35 35
	Total tons handled inbound	274	Cost..		152.08	Inbound cost of handling per ton (cents)		55 50
	Total tons handled	717	Cost	.	$308 70	Combined cost of handling per ton (cents)		43.05

TABLE VII—INBOUND TONNAGE AND COST OF HANDLING AT ST. LOUIS FREIGHT HOUSE OF M. K. & T. RY. ON OCT. 9, 1916

No.	Occupation	Days	Hours	Rate	Amount			Pounds
1	Verification	1	0	$70.00	$2 69			
0	Receiving and loading clerks	0	0	.	00			
3	Unloading and transfer clerks	3	...	65.00	7 50			
0	Routing clerks	0	0	....	00	Inbound cars (M. K. & T.)	4	40,193
1	Delivery clerks	1	0	65 00	2.50	Cooler cars	0	
2	Delivery clerks	2	0	70.00	5 38	Inbound cars (T. St. L. & W.)	25	338,154
7	Total	7	....	.... .	$18.07	Total	29	378,347
	Handling:					Cars transferred	0	....
0	General foreman	0	.	. ..	00	Inbound shipments delivered	140	((M. K. & T.)
1	1st ass't foreman	1	...	$85.00	$3.27		452	(T. St. L. & W.)
0	2nd ass't foreman	0	. ..	..... .	00	Cars delivered in yard	592	....
11	Pickers		100½	.20	20.10	Reported for work	7	(a.m.)
0	Stowers		0	. .. .	00	Hours relieved	6	(p. m.)
20	Truckers		194½	.19	36 95	Hours on duty	10	....
0	Coopers		0	.	00			
0	Current				2 83			
0	Electrician	.	.		....			
32	Total	1	295	....	$63.15			
39	Grand total	...		....	$81 22			

Total tons handled inbound, 189. Inbound cost of handling per ton (cents), 42.97.

TABLE VIII—OUTBOUND TONNAGE AND COST OF HANDLING AT ST. LOUIS FREIGHT HOUSE OF M. K. & T. RY. ON OCT. 9, 1916

No.	Occupation	Days	Hours	Rate	Amount			Pounds
0	Verification	0	0	$0 00	$0 00			
7	Receiving and loading clerks	7	0	70 00	21 52			
5	Unloading and transfer clerks	5	0	65 00	12.50	Outbound (T. St. L. & W.)	5	25,857
1	Routing clerks	1	0	70.00	2 69	Outbound (M. K. & T.)	47	794,240
1	Car sealer	1	0	55 00	2 11	Cooler	1	6,470
0	Delivery clerks	0	0	.. . .	00	Inbound	0	0
14	Total	14	0		$38 82	Total	53	826,567
	Handling:							
1	General foreman	1		$115 00	$4 42	Cars transferred	11	
0	1st ass't foreman	0	..	.	00	Cars delivered in yard	1	(M. K. & T.)
0	2nd ass't foreman	0		. .	00		6	(T. St. L. & W.)
10	Pickers		100	20 00	20 00			
8	Stowers		80	21 00	16 80	Cars loaded in yards	1	(M. K. & T.)
36	Truckers		360	19 00	68 40		0	(T. St. L. & W.)
1	Coopers		10	21 00	2 10	Reported for work	7	(a.m.)
						Hours relieved	6	(p.m.)
56	Total	1	550	.	$101 72	Hours on duty	10	.
70	Grand total				$140 54			
	Total tons handled outbound	413	Cost		$140 54	Outbound cost of handling per ton (cents)	.	34.02
	Total tons handled inbound	189	Cost		81 22	Inbound cost of handling per ton (cents)	.	42.97
	Total tons handled	602	Cost		$221 76	Combined cost of handling per ton (cents)	.	36.83

from $1 to $20 per square foot. This is based on a floor area of 1000 sq.ft. per car.

Data covering the freight house of the New York Central Lines located at Columbus, Ohio, show an average operating cost of 38.6 cents per ton. From this freight house about 900 cars per month are handled. To give a general idea of the cost of service in additional existing freight houses, a number of interesting operating costs are herewith presented to assist electric railway men to determine the probable cost of operation of their freight terminals.

Table I shows the cost data for handling freight at the Columbus freight house of the Ohio Electric Railway. The tonnage includes the freight forwarded and received, local and interline, but does not include the transfer freight handled in local cars for other divisions. There are no figures available on just what this amounts to, although at one time a record was kept at the Dayton freight house, which is a large transfer point, and it was found that the transfer-freight cost was about one-third of the total freight-handling expense. In the case of the Columbus freight house it would not be so large.

The cost of handling freight on the Ohio Electric Railway varies from 11 cents to 25 cents per 1000 lb., or about 22 cents to 50 cents per ton. This variation is due to physical conditions at the freight house, which sometimes do not permit as much direct loading from wagons into the cars as desired.

It is the policy of the company that rather than spend a large amount of money to enlarge freight houses to take care of increased business, it is better and cheaper, from not only the investment standpoint but also the operating standpoint, to build team tracks to permit the loading of freight direct from the wagons and tracks into the cars. There are a number of advantages in direct loading, for the receiving clerk checks the freight into the car and notes the car number on the bill of lad-

TABLE IX—COST OF HANDLING ALL KINDS OF FREIGHT AT PRINCIPAL STATIONS OF THE GULF, COLORADO & SANTA FE RAILWAY

					Total Cost Freight Handling, L. C. L.											
					Trucking Force				Clerical Force (Supervision)				Distance in Feet Freight Is Handled			
Station	Month	Tons Handled	Total Payroll	Cost per Ton	Avg. No. Men per Day	Total Payroll	Cost per Ton	Tons per Man per Day	Avg. No. Men per Day	Total Payroll	Cost per Ton	Tons per Man per Day	Longest	Shortest	Average	Kind
Houston	Jan. 16	5,469	$1,268.16	23.2	13.5	$571.83	10.5	15.6	9	$696.33	12.7	23.4	1,140	70	80	All
	Feb. 16	5,882	1,289.50	21.9	14	589.50	10	16.8	9	700.00	11.9	26.1				
	Mar. 16	6,793	1,338.28	19.7	15	638.28	9.4	16.7	9	700.00	10.3	27.9				
	April 16	5,837	1,325.16	22.7	14.5	625.16	10.7	16.1	9	700.00	12	25.9				
	Total	23,981	5,221.10	....	57	2,424.77	....	....	36	2,796.33	....	....				
	Average	5,995	1,305.27	21.8	14.3	606.19	10.1	16.3	9	699.08	11.7	25.9				
Dallas	Jan. 16	5,213	$2,209.41	42.4	32	$1,586.41	30.4	6.3	9	$623.00	12	22.3	495	25	260	All
	Feb. 16	5,594	2,369.01	42.3	35	1,746.01	31.1	6.4	9	623.00	11.2	24.9				
	Mar. 16	6,402	2,409.76	37.6	35.5	1,745.47	27.2	6.7	9.5	664.29	10.4	25				
	April 16	5,755	2,570.43	44.7	38	1,870.11	32.5	6.1	10	700.32	12.2	23				
	Total	22,964	9,558.61	...	140.5	6,948.00	...	....	37.5	2,610.61	...	....				
	Average	5,741	2,389.65	41.6	35.1	1,737.00	30.3	6.4	9.3	652.65	11.3	23.9				
Temple	Jan. 16	5,395	$1,920.00	35.6	25	$1,422.00	26.4	8.3	7	$498.00	9.2	29.6	800	50	250	All
	Feb. 16	5,144	1,914.78	37.2	26.8	1,416.78	27.5	7.7	7	498.00	9.7	29.4				
	Mar. 16	5,923	2,218.31	37.5	30.5	1,720.31	29.1	7.2	7	498.00	8.4	31.3				
	April 16	5,232	2,010.06	38.4	27.7	1,512.06	28.9	7.6	7	498.00	9.5	29.8				
	Total	21,694	8,063.15	....	110	6,071.15	....	....	28	1,992.00	....	....				
	Average	5,423	2,015.79	37.2	27.5	1,617.79	28	7.7	7	498.00	9.2	30.1				
Ft. Worth	Jan. 16	2,856	$932.57	32.6	14.7	$694.57	24.3	7.5	3	$238.00	8.3	36 6	470	50	200	All
	Feb. 16	2,855	882.39	30.9	14.7	641.89	22.5	7.8	3	240.50	8.4	38.1				
	Mar. 16	3,436	895.11	26.1	14.5	654.61	19.1	8.8	3	240.50	7	42.4				
	April 16	3,424	905.84	26.4	14.8	665.34	19.4	9.3	3	240.50	7	45.7				
	Total	12,571	3,615.91	...	58.7	2,656.41	....	....	12	969.50	....	....				
	Average	3,145	903.98	28.7	14.7	664.10	21.1	8.3	3	239.87	7.6	40.6				
Galveston	Jan. 16	1,758	$543.02	30.9	10	$378.02	21.5	6.8	2	$165.00	9.4	33.8	417	20	250	All
	Feb. 16	2,233	550.65	24.7	11	385.65	17.3	8.1	2	165.00	7.4	44 6				
	Mar. 16	2,696	611.46	22.7	11	446.46	16.6	9.1	2	165.00	6.1	49.9				
	April 16	2,040	544.06	26.7	9	379.06	18.6	9.1	2	165.00	8.1	40.8				
	Total	8,727	2,249.19	....	41	1,589.19	....	....	8	660.00	....	....				
	Average	2,182	562.29	25.7	10.3	397.29	18.2	8.2	2	165.00	7.5	42.3				
Cleburne	Jan. 16	2,254	$539.00	23.9	7	$303.00	13.4	12.4	3	$236.00	10.5	28.9	495	25	260	All
	Feb. 16	2,207	538.25	24.4	7	302.25	13.7	12.6	3	236.00	10.7	29.4				
	Mar. 16	2,256	559.25	24.8	7.1	323.25	14 3	11.8	3	236.00	10.5	27.8				
	April 16	2,298	528.50	23	6.5	292.50	12.7	14.1	3	236.00	10.3	30.6				
	Total	9,015	2,165.00	....	27.6	1,221.00	....	....	12	944.00	....	....				
	Average	2,253	541.25	24	6.9	305.25	13.5	12.7	3	236.00	10.5	29.2				
Beaumont	Jan. 16	2,160	$586.00	27.1	8	$380.00	17.6	10.4	3	$206.00	9.5	27.7	440	40	200	All
	Feb. 16	2,203	607.00	27.6	8	401.00	18.2	11	3	206.00	9.4	29.4				
	Mar. 16	2,380	614.25	25.8	8	408.25	17.2	11	3	206.00	8.6	29.4				
	April 16	2,192	593.10	27.1	8	387.10	17.7	11	3	206.00	9.4	29.2				
	Total	8,935	2,400.35	....	32	1,576.35	....	....	12	824.00	....	....				
	Average	2,233	600.09	26.8	8	394.09	17.6	10.8	3	206.00	9.2	28.9				
Gainesville	Jan. 16	854	$256.00	30	4	$176.00	20.6	8.2	1	$80.00	9.4	32.8	450	50	200	All
	Feb. 16	917	257.52	28.1	4	177.52	19.4	9.2	1	803.00	8.7	36.7				
	Mar. 16	900	249.60	27.7	4	169.60	18.8	8.3	1	80.00	8.9	33.3				
	April 16	881	256.00	29.1	4	176.00	20	8.8	1	80.00	9.1	35.2				
	Total	3,552	1,019.12	....	16	699.12	....	....	4	320.00	....	....				
	Average	888	254.78	28.6	4	174.78	19.6	8.6	1	80.00	9	34.5				
RECAPITULATION OF AVERAGES																
Houston		5,995	$1,305.27	21.8	14 3	$606.19	10.1	16.3	9	$699.08	11.7	25.9	1,140	70	80	All
Dallas		5,741	2,389.65	41.6	35.1	1,737.00	30.3	6.4	9 3	652.65	11.3	23.9	495	25	260	All
Temple		5,423	2,015.79	37.2	27.5	1,517.79	28	7.7	7	498.00	9.2	30.1	800	50	250	All
Fort Worth		3,143	903.98	28.7	14.7	664.10	21.1	8.3	3	239.87	7.6	40.6	470	50	200	All
Galveston		2,182	562.29	25.7	10.3	397.29	18.2	8.2	2	165.00	7.5	42.3	417	20	250	All
Cleburne		2,253	541.25	24	6.9	305.25	13.5	12.7	3	236.00	10.5	29.2	495	25	260	All
Beaumont		2,233	600.09	26.8	8	394.09	17.6	10.8	3	206.00	9.2	28.9	440	40	200	All
Gainesville		888	254.78	28.6	4	174.78	19.6	8.6	1	80.00	9	34.5	450	50	200	All

ing. It is almost impossible to load the goods into the wrong car; the whole shipment moves in the same car; there is less handling of freight; there is no trucking expense in the freight house, thus permitting more room for the handling of inbound freight, and there is less liability from claims arising from extra handling or goods lying around the freight house.

At the large freight houses, such as those at Dayton, Springfield, Columbus, Lima and Toledo, the freight forces work twenty-four hours a day. This has been found to be very advantageous, as the night men transfer the freight from the cars into the house. Thus the freight is ready for delivery as soon as the house is opened in the morning. This same force also loads up as much freight as possible so that when the day force arrives the house is cleaned up and ready for the day's business.

The costs of operating two steam-railroad freight houses, one belonging to the Norfolk & Western Railway at Columbus, Ohio, and one to the Chicago, Rock Island & Pacific Railway at Fort Worth, Tex., are shown in Table II and Table III. Table IV gives operating data on the Los Angeles freight house of the Pacific Electric Railway. A study of these data may be of particular interest to electric railway men who are interested in the electric railway freight-house operating costs.

As a matter of special interest, data on the Broadway double-deck freight house operated by the Missouri, Kansas & Texas Railway, St. Louis, Mo., are shown in Tables V, VI, VII and VIII. In these tables it will be noted that the inbound and outbound costs are separated, but a combined cost is figured on the outbound sheets. The amount was 43.05 cents per ton on March 30, 1918. The office clerical force is not included in arriving at the cost per ton, but the laborers for loading and unloading the transfer clerks, the general foremen and the assistant foremen are included. Moreover, 1½ cent per ton is included on the inbound cost for current consumed by the elevators.

From Table VIII it will be noted that this road on Oct. 9, 1916, handled, inbound and outbound, 1,204,000 lb. of package merchandise. On this date they delivered to the drays from the inbound platform 592 inbound shipments, representing 285,200 lb. On the same day, 137 drays loaded from the inbound platform, the average tonnage for each dray being 2080 lb. There were 82 cars loaded and unloaded, the average tonnage per car being 14,681 lb., inbound and outbound. On that day fifty-six truckers worked, averaging per warehouse truck load 254 lb. The total tonnage handled by each trucker was 21,800 lb., and a close estimate of the number of packages handled was 16,200.

One particular advantage of this double-deck type of freight house is that the inbound storage platforms run across the building instead of lengthwise. An elevator is located on each of the inbound platforms, which are separated by 40-ft. driveways. Freight can be handled in double-deck freight houses economically providing the house is properly laid out, and the elevators so located as to be able to take care of the unit moves.

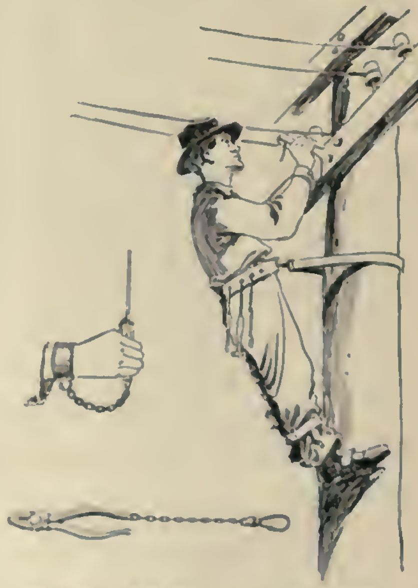
Many engineers have laid great stress on the cost of trucking freight. They seem, however, to have been laboring under the impression that if the trucking is reduced, the cost per ton is decreased, but this is not the case. By working out the platform sheets, it will be noted that the percentage of trucking does not enter into the proposition. The layout of the freight house and supervision are what controls the cost of handling of package freight.

The elevators in the Broadway Station of the Missouri, Kansas & Texas Railway are 14 ft. 8 in. long in the clear, and 8 ft. 7 in. wide in the clear, and they operate at a speed of 75 feet per minute. Each elevator handles an average of fifteen loads per hour, averaging 30,000 lb. per elevator per hour. When operated at their full capacity, they handle on an average of 300,000 lb. per day.

Table IX shows the cost of handling freight in the principal stations of the Gulf, Colorado & Santa Fé Ry. The study was made for the purpose of determining the proper balance between mental and manual labor in freight handling. These data may be of particular interest in showing how steam railroads endeavor to arrive at a definite cost of operating different stations on their lines.

Preventing the Dropping of Linemen's Tools

IN line with the "safety first" movement in all branches of industry the following method of securing linemen's tools has proved very successful. To avoid the accidental dropping of such tools which may result in injury to the passer-by as well as prove a source of inconvenience to the workmen each tool is fastened to the belt by means of small chain with a snap catch. To eliminate the danger of causing short-circuits to live wires these chains should not exceed 5 in. in length. A band with a ring is buckled round the wrist of the linemen and while using any particular tool this is unsnapped from the belt and fastened to the wrist band. The short length of chain gives sufficient freedom for carrying out the work and there is no danger of the tool being dropped to the ground.



"SAFETY FIRST" ATTACHMENTS FOR LINEMAN'S TOOLS

Papers Read at I. E. R. A. Chicago Meeting

At Annual Meeting Illinois Association Shows Vital Interest in Regulation, Safety and Freight and Express Transportation

AT THE MEETING of the Illinois Electric Railways Association, held in Chicago on Jan. 17, papers were presented by H. B. Adams, safety supervisor Aurora, Elgin & Chicago Railroad; Hon. Carl D. Jackson, chairman Wisconsin Railroad Commission, and Charles A. Laney, traffic manager Northern Ohio Traction & Light Company. R. N. Hemming, superintendent of transportation Fort Wayne & Northern Indiana Traction Company, repeated the allegory of the "Grim Reaper" and followed with an address on the subject of the conservation of humanity. H. A. Johnson also sent a brief paper on mechanical developments of the industry. The discussion at the meeting was digested in the issue of the ELECTRIC RAILWAY JOURNAL for Jan. 25, page 179. This included the additions made by Mr. Laney to the text of his paper as printed in the issue for Nov. 30, 1918. The same is true with regard to Mr. Henning's address. Abstracts of the papers by Messrs. Johnson, Jackson and Adams follow.

Mechanical Developments of the Industry*

Developments in the Mechanical Engineering Division Include the Increased Use of One-Man Cars and Power Checking Device

BY H. A. JOHNSON

Master Mechanic Chicago Elevated Railways

IN LOOKING over the progress made in the mechanical engineering division of the electric railway industry during the past year it seems to me that the chief items of interest may be grouped under four general headings as follows: (1) Continued experimentation on the types of car bodies with reference to the exit and entrance of passengers and methods of fare collection; (2) the extended use of the one-man car (3) power checking devices and (4) the Electric Railway War Board "standardized" car.

1. Various combinations and locations of doors are now being used, such as, (a) entrance at the rear—exit at the front; (b) both entrance and exit at the center of the car; (c) both entrance and exit at the front of the car, and (d) entrance at the front and exit at the center of the car. As to methods of fare collection there is the prepayment plan where the passenger pays either on the rear platform or at the front of the car at time of entrance, and the 'pay-pass" system in which the conductor is located at the center door of the car, which in this case is used as an exit. Passengers remaining in the front part of the car pay their fare as they pass the conductor when leaving the car, while those who go into the rear half of the car pay the conductor upon passing to the rear section and then exit directly from the rear at the center exit door.

2. During the last year the use of the one-man car has been widely extended and this method of operation is being applied to larger cars. The small one-man safety cars are being placed in operation in larger cities than ever before. The American Electric Railway Association War Board submitted a brief on one-man cars after studying their operation in the following cities: Columbus, Ga.; population 21,000; Tampa, Fla., population 37,000; Beaumont, Tex., population, 50,000; Houston, Tex., population 120,000; Fort Worth, Tex., population with soldiers 100,000; El Paso, Tex., population with soldiers 100,000; Tacoma, Wash., population 100,000; Seattle, Wash., population 400,000; Everett, Wash., population 25,000, and Bellingham, Wash., population 37,000.

The War Board summarized the information gained in its study as follows: First, the one-man safety car is applicable to a wide range of electric railway conditions; second, safety cars of new construction permit enormous savings in fuel; third, all safety cars permit greatly increased service to the public while still permitting a large reduction in platform personnel; fourth, the safety car, because of the use of automatic devices, can be operated at a higher schedule speed by one man than an older style car can be operated by two men; fifth, the safety car fully justifies its name as a preventer of accidents through the inter-operation of control, brakes, doors, steps, sander and emergency brake; sixth, only the economies in operation and improvements in service made possible by the safety car have made it financially practicable to maintain railway service in small cities where short headways are a necessity and in larger cities where the shortage of labor has seriously impaired the ability to give adequate service even with but one man per car, as at Seattle and Tacoma; seventh, the safety car is preferred by the men themselves because it eliminates all manual labor and avoids division of responsibility with a second platform man; eighth, the safety car promotes better public relations in demonstrating the good-will of the railway, thereby paving the way for a solution of the local utility problems.

3. Since the United States entered the war and since the unfavorable experience of last winter in connection with the coal situation, the Fuel Administration and the Electric Railway War Board have advocated economy to reduce the amount of fuel necessary to operate the electric railways. This has caused many companies to install some device for measuring or checking the amount of energy used by motormen for the operation of cars or trains. Although these devices were being installed by a considerable number of companies before the war, the last year has given an added impetus to this movement and in checking up the various installations it seems that, practically without exception, the devices are producing good results. I believe that shortly every electrically operated car will be equipped with some kind of a power-checking device.

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*Abstract of a paper prepared for delivery before the Illinois Electric Railways Association in Chicago on Jan. 17, but not read because of the absence of the author.

4. The development and sale of the one-man safety car during the last four years was one of the first long steps toward a uniform electric railway car. It was found that these one-man safety cars could be built on a stock order by the car builders and later sold to various railway companies. The idea of a "standardized" car has been further worked out by the American Electric Railway Association War Board in co-operation with the United States Bureau of Industrial Housing and Transportation, following a request for designs and specifications from Otto M. Eidlitz, director of the bureau. The problem was to design one or two uniform cars which could be ordered from the car builders by the government in comparatively large quantities and be placed in any part of the country to meet the requirements of the local railway system. This would reduce the cost of cars especially to those companies ordering in small quantities. Keeping these cars in stock would enable the local railway company to obtain prompt relief and save the time necessary to build cars to its specifications.

As the designs and specifications were completed just prior to the signing of the armistice, we did not have a good opportunity to try out the operation of these cars in various parts of the country, but the fact that a car upon which a committee could agree could be designed is certainly a great step in advance in the electric railway field and points toward interesting and valuable development in the future.

Public Utility Regulations*

Commissions Have Justified Their Existence During War Period—Municipal Ownership Not Ultimate Solution of Present Problem

BY HON. CARL D. JACKSON
Chairman, Wisconsin Railroad Commission.

PUBLIC utility and railroad acts provide that the rates shall be reasonable, fair and non-discriminatory. They are subject to investigation either on petition of municipalities or consumers, or on the petition of the public utility. The spirit of the laws was one not only of securing just and fair rates to the consumers but of establishing just and fair rates for the public utility. While regulation in its present form unquestionably grew out of the necessity of curbing any unjust exercise of arbitrary power by those engaged in the public utility business, and while it was unquestionably the intent of the legislators that public utility commissions would prevent any such abuse and secure to the consumers fair, reasonable and non-discriminatory rates, a glance at the statutes will also show that the legislators had in mind a fair and square deal to the public utilities and those investors who risk their capital in establishing and developing utility service for the benefit of the public.

Unquestionably there was also the thought that this power of regulating rates should be placed in a body competent to handle the matter fairly and justly to all having an interest in the matter. Such a body could act intelligently only when it understood the problems of manufacture and distribution and had at hand the assistance of experts, both statistical and engineering, capable of furnishing necessary information to those acting upon the subject.

HAVE THE COMMISSIONS JUSTIFIED THEIR EXISTENCE?

During the early history of regulation, the improvement in the generation and distribution of electrical energy often made it possible to bring about lower rates to the consuming public without affecting a fair return to the public utility. However, a severe and wholly unforeseen test of regulation came with the world war. With new labor conditions, world monetary inflation, and greatly increased operating costs in practically all departments, the public utilities faced in a large number of instances throughout the United States emergency conditions demanding relief to prevent bankruptcy and to permit a continuance of public service. Have the commissions as a whole met this test and justified their existence? In answer, I think that it can be said that on the whole the commissions have acted justly, fearlessly and patriotically, and that in years to come the measures taken to meet the entirely changed conditions will redound to the credit of these commissions. Secondly, I am of the opinion that with exceptions here and there, the great body of the consuming public have understood the necessity for the actions taken, have patriotically and fairly accepted and approved of these actions, and that on the whole the public utility commissions still retain the confidence and respect of the public.

I am perfectly aware that in some instances we shall be met by the claim on the part of the public utilities that the action taken by the commissions has not been adequate or has been delayed, or that it has not given the full measure of relief demanded. Perhaps some will deny that the commissions have met the situation as it should have been met. On the other hand, many instances in all the different states can be found where the actions of the commissions have not always been received without adverse and sometimes bitter criticism on the part of some particular community. This is especially so in those instances where relations between the public and the public utility are either subjects of long political struggle or are positively unfriendly.

THE UTILITIES HAVE BORNE THE BURDEN

It has been our experience in Wisconsin that in the vast majority of instances where applications have been filed with the commission for necessary increases in rates such applications have not been filed by the public utilities until they themselves have for some time borne the burden of changed conditions, and very often the relief asked has been of an emergency or temporary nature and often without a demand for a full measure of return. Such attitude on the part of these public utilities, which could and did bear their share of the war burden without asking the full transfer to the consuming public, should be fully recognized and appreciated. Certainly my own experience with the different utilities has convinced me that in the large majority of cases the public utilities are operated by men with the highest sense of patriotism and with a liberal spirit.

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*Abstract of address presented at annual convention of Illinois Electric Railways Association, Chicago, Jan. 17, 1919.

I believe that regulation has on the whole justified itself and that it must and will remain as a permanent public policy. There are many reasons why this should be so. On the one hand, no one acquainted with the temper of the public mind can for a moment conceive that public utilities will be allowed a free hand either in making rates or in establishing practices. The return to the unregulated condition of twenty years ago is not contemplated by the public. Therefore, if our public regulating bodies are not to remain, something must be substituted for them, either public ownership of all public utilities with regulation by the public owning body, or the substitution of regulation through local units for regulation by an expert body. The only substitute for these alternatives is federal regulation of all public utilities throughout the United States, a proposition which I do not think will appeal either to the public utilities or to the thinking citizen.

THE AVERAGE CITIZEN IS UNKNOWINGLY PART OWNER OF THE LOCAL UTILITY

Perhaps during the last year and a half, or two years, regulation would have been more easily acquiesced in by the consuming public where dissatisfaction may have existed, were the public really to think more clearly below the surface of things. The actual ownership of most public utilities is by the people themselves. The first liens on most public utilities are very often owned by trust companies, banks, and largely by insurance companies throughout the United States. Nearly every man carries an insurance policy. The average citizen has a bank account, yet not one citizen out of a hundred realizes that in one form or another his actual savings and insurance and his wife's and children's welfare depend upon the solvency and continued operation of public utilities. There is probably not one man in fifty whom we meet on the street who does not own a part of a public utility, whether he knows it or not. So the questions relating to public utilities are not confined to the consumers on one side and the public utilities as such on the other, but the whole question is one involving financially nine-tenths of the entire population. Furthermore, public utilities should not only be solvent in themselves, but there should still remain a reasonable incentive to reasonable development along the lines to be demanded by future generations. Nothing should take place in this country to discourage individual and collective efforts along progressive lines.

The public utility law in Wisconsin recognizes public ownership of public utilities as a contingency which may be desirable. The public utility law provides the necessary machinery therefor, and some public utilities, mostly water works, have been taken over from time to time and are now municipally owned, and in many instances successfully operated. Up to the present time there has not been a pronounced movement in the direction of general public ownership, nor would it, in my opinion, be a solution of any existing problems. If public ownership shall increase in the future it should be undertaken gradually and only where the municipality is in a position to acquire such public utility and handle it efficiently. In many instances the municipalities are not in a position to take over the large systems though in some instances they act as distributors, buying the power at wholesale rates.

The most pressing and difficult problem now presented in the public utility line is unquestionably in the street railway field, where the conditions cannot be said to be satisfactory either to the public or to the companies. In Wisconsin's smaller cities, the problem has in some instances become acute, and the question is really one of continuing to render public service. In many instances the feeling is growing that direct municipal participation is perhaps advisable and fully justified. Certainly the solution is not in federal control or operation of public utilities, unless it be a mere question of regulation of interstate relations. There is nothing in the present federal control, either of railroads or the telephone companies, which encourages one to believe that the solution of any public utility problems lies in a federal direction. My conclusion, is that the welfare of the utilities, the communities and the state depend upon the continued regulation and control through commissions and that their abolition can mean nothing but loss to investors, general financial unrest, deteriorating service to the public and abandonment of all hope for future progress through individual initiative and enterprise.

If the public could learn the facts in regard to valuation and operating results of utility properties, many of the difficulties of regulation would be eliminated. Take the question of valuation alone. It is not an uncommon thing for experts on one side to differ with experts on the other in the ratio of three to one as to the value of the property, the experts for the utility including all possible elements of valuation or reproduction, while the experts for the municipalities are often equally as far from the truth. These various figures are given publication either in the newspaper or from the stump and the public, which isn't an expert to begin with and hasn't the time or means actually to arrive at the facts, is left in a confused state of mind, and only in so far as it has confidence in the commission's fairness and ability is it able to arrive at anything like the actual truth. We have been hoping in Wisconsin finally to fix upon valuations which shall be stable for the value, subject only to those changes coming from renewals, extensions, etc. If this condition could possibly be brought about and the public utilities would in all instances follow the commission's rulings as to the treatment of new capital, renewals, depreciation funds, etc., a large element of discussion and dispute would be eliminated. The same could follow in the matter of revenues and disbursements.

The Preservation of Humanity*

The Management of an Electric Railway Is Responsible for the Safety of Its Employees and Should Lead in Safety Work

By HENRY B. ADAMS
Safety Supervisor Aurora, Elgin & Chicago Railroad, Aurora, Ill.

SAFETY work by electric railways has been more or less a feature of operation during several years past, and many companies have reaped benefits commensurate with the effort put forth. At a time like this the analysis of statistics is tiresome, but such analysis is worth while in proving that continual, regular and systematic work brings results in proportion to the unanimity with which the management and the employees co-operate for the prevention of accidents.

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*Abstract of a paper presented at annual convention of Illinois Electric Railway Association, Chicago, Jan. 17, 1919.

Our nation has voluntarily given many of its best citizens and vast amounts of money and materials to make the world safe forever from the power of evil autocracy over the lives and well-being of the people, and when we realize that in connection with our allies this magnificent result has actually been accomplished, our hearts swell with patriotic pride in the knowledge that the co-operation of over 100,000,000 individuals, all doing our full share, was the prime factor in the glorious victory. But the loss of life through so-called accidents in the United States during the period of the war exceeds the deaths in the entire army of the nation for the same time. Now that our thoughts are free from war problems, let us direct our energies to the elimination of the causes which bring so much sorrow and suffering to our fellow citizens.

The management of an electric railway carries a vast responsibility for the safety of its employees and its patrons, and should lead in safety work. It should first do all that is possible to eliminate dangerous physical conditions, and then ask for the co-operation of employees in the work of correcting careless and dangerous practices. The company and its employees should be always ready to take an active part in public safety, and not selfishly confine to their own properties their efforts in saving life and limb. There are many methods of doing safety work, and we are all desirous of showing results.

As he who profits by his own experience does well, he who profits by the experience of others does better, and hence membership in the National Safety Council is advisable in that it furnishes the ideas of safety workers from all over the country. The National Safety Council, the greatest organization in the world for the prevention of accidents, furnishes its membership with weekly bulletins which are forceful and up to date; has a large number of stereopticon slides and moving picture films, and has a library of safety literature of unlimited scope, the use of which is available to members at actual cost. It also furnishes first-class speakers for safety meetings anywhere, without charge beyond actual traveling expenses. The headquarters are in Chicago, where is maintained a corps of competent safety experts always ready to confer with and advise members upon questions of organization and special problems in safety work. There are now 131 electric railways operating nearly 16,000 miles of track who are receiving the benefit of the Council through its electric railway section.

The International Register Company has practically completed the airplane instrument work for the Army and Navy which it had undertaken during the war period and is now prepared, with about double its former facilities, to handle promptly all electric railway orders. A statement in Professor Richey's report on the Boston zone system, recently published in this paper, relating to the crowded condition at this company's shops, was based on a statement made by the company before the armistice was declared and does not apply to present conditions.

Manufacturers' Night Celebrated by New England Street Railway Club

Four hundred and fifty members and guests of the New England Street Railway Club assembled at the Hotel Somerset, Boston, Mass., on Jan. 23, to celebrate Manufacturers' Night, which has become an annual institution in the affairs of the club. The entire evening was devoted to relaxation and from the opening strains of the "Star Spangled Banner" to the close of the vaudeville entertainment which followed the dinner, good-fellowship reigned supreme. Nearly 100 electric railway manufacturing and supply organizations contributed to the success and hospitality of the occasion. William W. Field was general chairman and Charles C. Peirce director of the evening's program, the committee chairmen being: George C. Ewing, hotel; Warren L. Boyer, finance; George Acker, entertainment, and Charles A. Record, program.

Cedarmen Meet at Minneapolis

THE Northern White Cedar Association held its twenty-third annual meeting at Minneapolis, Minn., on Jan. 22, with representatives of twenty-four firms in attendance. In outlining the situation in the white cedar industry President Gerich called attention to the importance of the labor problem in this field, where labor constitutes so large a part of the total expense. He urged that labor unrest and trouble be forestalled by showing the men that increased production and higher wages are partners, and by creating as nearly ideal living and housing conditions as is possible in camp life. He said further that, while dormant recently, the competition from steel and iron fence posts, which have been popularized by means of scientific advertising, is increasing. The association has not done much in the way of post advertising, but the pole advertising has been continued during the past year with good results. The actual consumer has been reached directly, particularly through the trade journals.

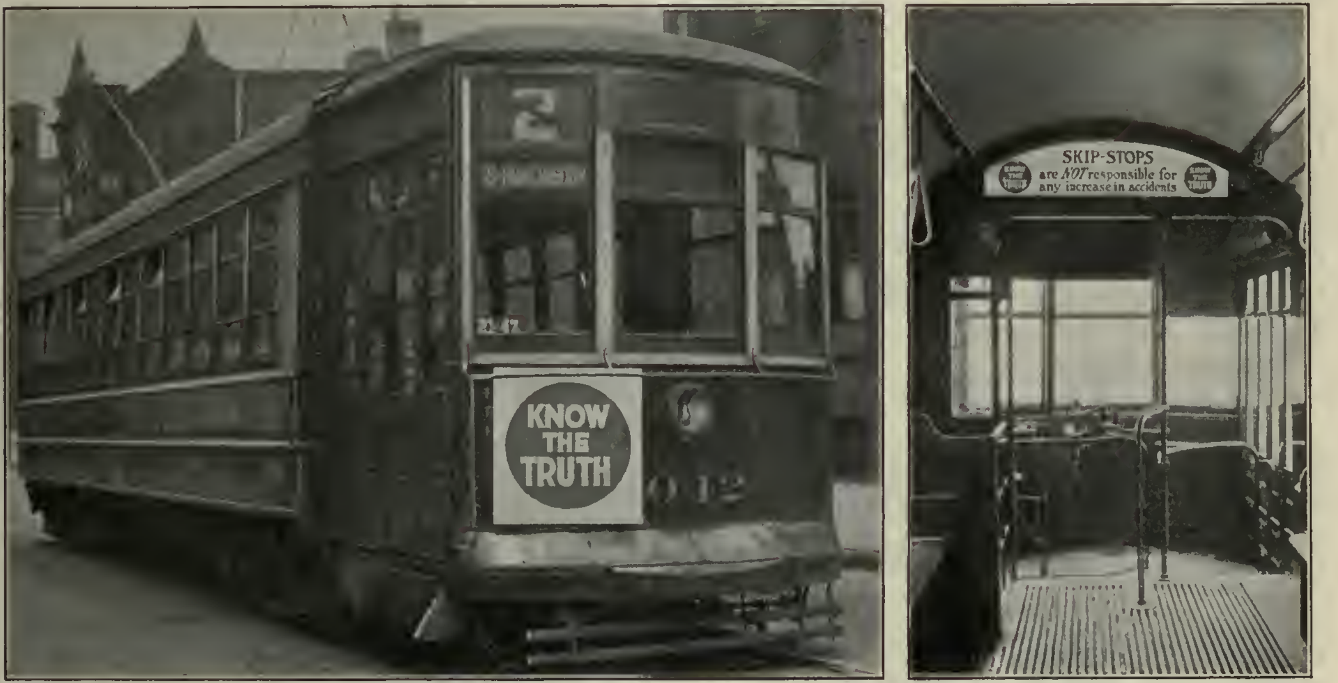
Secretary Boucher reported for a number of committees of the association, the work of which had to do with practical matters such as accident compensation, transportation relations, inspection, etc. He stated that considerable dissatisfaction had resulted from the specifications for ties prescribed by the United States Railroad Administration. A meeting of manufacturing tie contractors had been scheduled to be held at an early date to consider the matter. In the discussion of the secretary's report it was stated that the pole situation was not as good as might be wished, the sales for the year being about 50 per cent of the preceding annual rate, while the stocks on hand were probably 75 per cent of the 1917 production. Weather conditions had not been favorable to the business. In this matter the arbitrary position taken by the carriers in the producing territory was causing producers no little concern.

The election of officers resulted in the choice of L. L. Hill, Page & Hill Company, Minneapolis, for president; L. A. Furlong, Valentine-Clark Company, for vice-president; W. B. Thomas of Manistique for treasurer; N. E. Boucher of Minneapolis for secretary, and Benjamin Finch of Duluth and M. J. Bell of Minneapolis for directors to serve two years.

Telling the Public the Truth About the Skip Stop

Strong Effort Being Made in Philadelphia to Acquaint the Public With the Merits of Rapid Transit and Correct Misapprehension About the Skip Stop

A VIGOROUS publicity campaign has been waged by the Philadelphia Rapid Transit Company since last December for the purpose of correcting statements made by certain of the local newspapers to the effect that the skip stop had caused an increase in fatal accidents, and for the further purpose of making generally known the many advantages to be secured by the public through a continuation of the skip-stop plan.


2
KNOW THE TRUTH
SKIP-STOPS are NOT responsible for any increase in accidents

FIGS. 1 AND 2—THE FIRST DASH SIGN FOLLOWED BY A BULKHEAD SIGN

The principal medium used for bringing the facts before the car riders was a series of signs carried on the front dash of the cars, in combination with interior signs in the bulkhead spaces over the end doors. As described in THE ELECTRIC RAILWAY JOURNAL for Dec. 7, 1918, the crusade was opened by the displaying on the front dash of all the cars of white cardboard signs (Fig. 1) bearing the words "Know the Truth" in large white letters in a bright red circle. The appearance of this sign on the streets caused wide conjecture and interest as to the meaning, and after this curiosity had been allowed to run for three days, the first of the interior bulkhead signs (Fig. 2) was posted, reading "Skip Stops are *not* responsible for any increase in accidents."

After three days, the front dash sign was changed to read as shown in Fig. 3, and at the same time the interior bulkhead sign, shown in Fig. 4, was displayed. The effect of this set of signs was to inform the public that the skip stop was not a plan local to Philadelphia, but that it had been adopted successfully in other large cities throughout the country.

As an evidence of the fairness of the company's position, and to refute the charge that the skip-stop plan was being forced upon the public against its will, the management announced that after the stops had been properly adjusted and the schedules shortened to take advantage of the time saving, the car riders on each line would be asked to decide by vote whether they wanted skip-stop operation continued or discontinued. Accordingly the dash sign reproduced in Fig. 5 was displayed on Dec. 10 and 11, and the interior sign, Fig. 6, was carried from Dec. 10 to Dec. 23 inclusive.

As exaggerated and misleading statements were still being made in certain quarters with regard to the skip-stop system, the front dash of the cars was again used for three days, Dec. 18, 19, and 20, for what is known as a "teaser" or mystery advertisement by posting in large, black letters a sign reading, "Proverbs XII:19," with the "Know the Truth" trade-mark reproduced in one corner (Fig. 7). The verse referred to in Proverbs is as follows: "The lip of truth shall be established forever: but a lying tongue is but for a moment."

The appearance of this sign sent many thousands of people scurrying for Bibles, and the application of the verse was generally appreciated. In this connection the secretary of the Philadelphia Branch of the American Bible Society promptly issued a public statement announcing that a great many people had visited the office of the Society seeking information as to the meaning of Proverbs XII:19. The Society expressed its appreciation of this method of advertising in the following words:

"The object of this communication is not to discuss the merits or demerits of the present system, but simply to call attention to the most commendable motive of the present management to take their patrons into their confidence and to secure, if possible, an intelligent decision. President Mitten and his associates should be commended in the highest possible terms for the substantial interest that they are showing in their thousands of employees and in their undoubtedly sincere efforts to do what is best for the largest number of citizens."

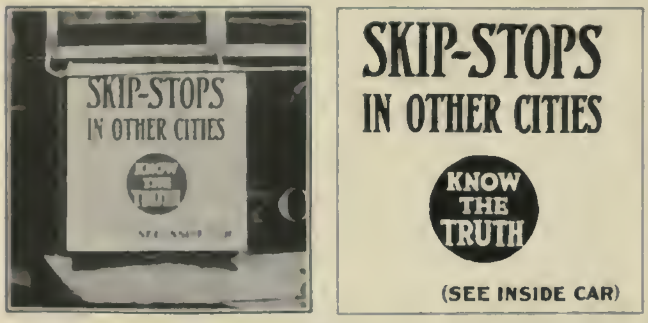


Fig. 3

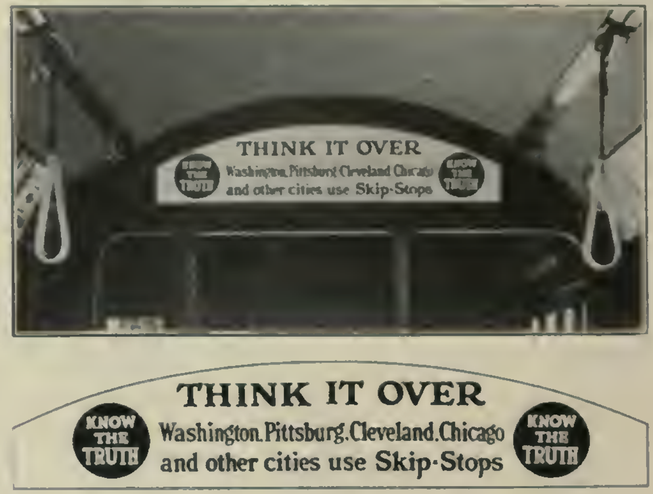

THINK IT OVER
KNOW THE TRUTH
Washington.Pittsburg.Cleveland.Chicago
and other cities use Skip-Stops
KNOW THE TRUTH
THINK IT OVER
KNOW THE TRUTH
Washington.Pittsburg.Cleveland.Chicago
and other cities use Skip-Stops
KNOW THE TRUTH

Fig. 4

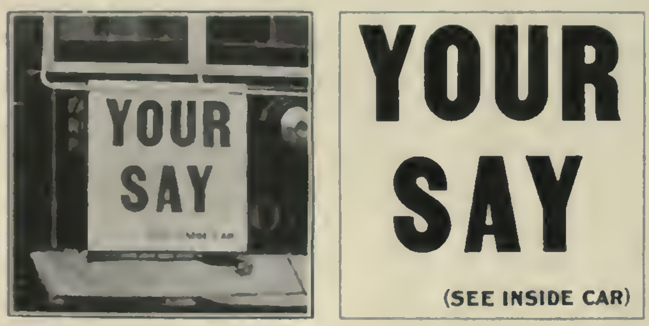


Fig. 5

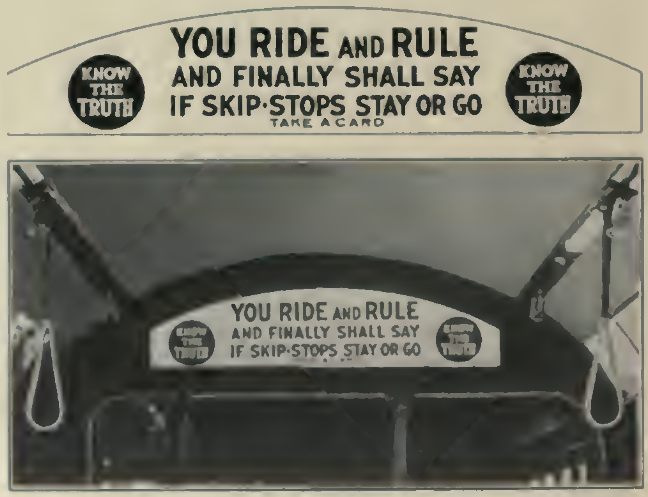


Fig. 6

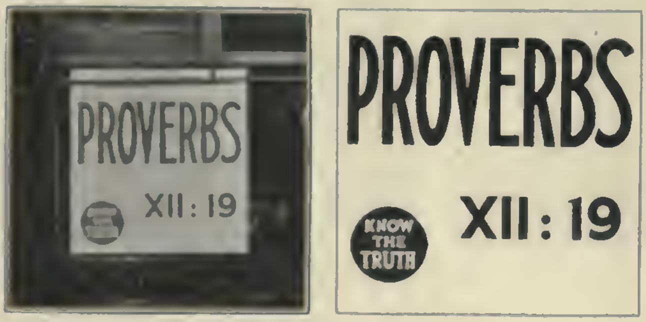


Fig. 7

FIGS. 3 TO 7—DASH SIGNS AND INSIDE BULKHEAD SIGNS IN THE ORDER OF THEIR USE

As stated in the article in these columns previously referred to, President Mitten, finding that, as a result of the misleading headlines in the newspapers, the public mind was becoming confused on the question of whether skip-stop operation was causing accidents, requested thirteen of the most representative citizens of the city to act as a committee for the purpose of determining the truth of these statements. The members of the committee were drawn from all walks of life, including state and city government, business, education, religion, and the home.

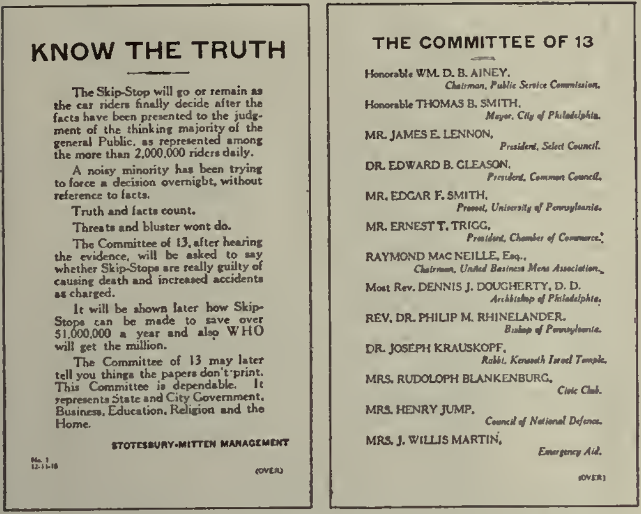
This committee held two public meetings at the City Hall for the purpose of hearing all who might have evidence or testimony to present as to the skip stop having been responsible for fatalities or casualties. It addressed an invitation to the responsible head of each of the newspapers which had made such charges, asking them to appear before the committee and present the evidence upon which these charges were based. None of the newspaper heads invited appeared, however, and none presented any evidence of any character.

On Jan. 3 the committee of thirteen made public its findings, which were in part as follows:

"1. That there has not been presented to the committee of thirteen any evidence to justify the charges made that deaths have been caused by skip stops.

"2. That there has not been furnished to the committee any evidence to prove that any other casualties have been caused by the operation of skip stops."

The coroner also appeared before the committee to give evidence concerning the testimony at the coroner's inquests held in such fatal trolley cases as had occurred



KNOW THE TRUTH

The Skip-Stop will go or remain as the car riders finally decide after the facts have been presented to the judgment of the thinking majority of the general Public, as represented among the more than 2,000,000 riders daily.

A noisy minority has been trying to force a decision overnight, without reference to facts.

Truth and facts count.

Threats and bluster wont do.

The Committee of 13, after hearing the evidence, will be asked to say whether Skip-Stops are really guilty of causing death and increased accidents as charged.

It will be shown later how Skip-Stops can be made to save over $1,000,000 a year and also WHO will get the million.

The Committee of 13 may later tell you things the papers don't print. This Committee is dependable. It represents State and City Government, Business, Education, Religion and the Home.

STOTESBURY-MITTEN MANAGEMENT

No. 1
12-11-18

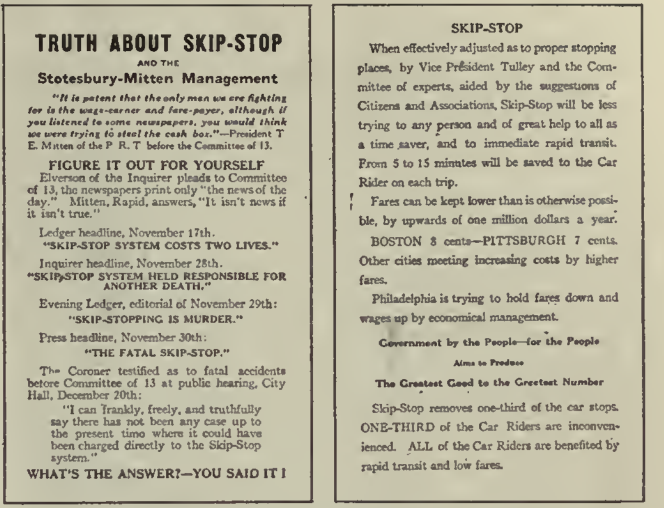
(OVER)

THE COMMITTEE OF 13

Honorable WM. D. B. AINEY, *Chairman, Public Service Commission.*
Honorable THOMAS B. SMITH, *Mayor, City of Philadelphia.*
MR. JAMES E. LENNON, *President, Select Council.*
DR. EDWARD B. GLEASON, *President, Common Council.*
MR. EDGAR F. SMITH, *Provost, University of Pennsylvania.*
MR. ERNEST T. TRIGG, *President, Chamber of Commerce.*
RAYMOND MAC NEILLE, Esq., *Chairman, United Business Mens Association.*
Most Rev. DENNIS J. DOUGHERTY, D. D. *Archbishop of Philadelphia.*
REV. DR. PHILIP M. RHINELANDER. *Bishop of Pennsylvania.*
DR. JOSEPH KRAUSKOPF, *Rabbi, Keneseth Israel Temple.*
MRS. RUDOLOPH BLANKENBURG, *Civic Club.*
MRS. HENRY JUMP, *Council of National Defence.*
MRS. J. WILLIS MARTIN, *Emergency Aid.*

(OVER)

FIG. 8—FRONT AND BACK OF CARD, GIVING NAMES AND PURPOSE OF COMMITTEE OF THIRTEEN



TRUTH ABOUT SKIP-STOP
AND THE
Stotesbury-Mitten Management

"It is patent that the only men we are fighting for is the wage-earner and fare-payer, although if you listened to some newspapers, you would think we were trying to steal the cash box."—President T E. Mitten of the P R. T before the Committee of 13.

FIGURE IT OUT FOR YOURSELF

Elverson of the Inquirer pleads to Committee of 13, the newspapers print only "the news of the day." Mitten, Rapid, answers, "It isn't news if it isn't true."

Ledger headline, November 17th.
"SKIP-STOP SYSTEM COSTS TWO LIVES."

Inquirer headline, November 28th.
"SKIP-STOP SYSTEM HELD RESPONSIBLE FOR ANOTHER DEATH."

Evening Ledger, editorial of November 29th:
"SKIP-STOPPING IS MURDER."

Press headline, November 30th:
"THE FATAL SKIP-STOP."

The Coroner testified as to fatal accidents before Committee of 13 at public hearing, City Hall, December 20th:

"I can frankly, freely, and truthfully say there has not been any case up to the present timo where it could have been charged directly to the Skip-Stop system."

WHAT'S THE ANSWER?—YOU SAID IT!

SKIP-STOP

When effectively adjusted as to proper stopping places, by Vice President Tulley and the Committee of experts, aided by the suggestions of Citizens and Associations, Skip-Stop will be less trying to any person and of great help to all as a time saver, and to immediate rapid transit. From 5 to 15 minutes will be saved to the Car Rider on each trip.

Fares can be kept lower than is otherwise possible, by upwards of one million dollars a year.

BOSTON 8 cents—PITTSBURGH 7 cents. Other cities meeting increasing costs by higher fares.

Philadelphia is trying to hold fares down and wages up by economical management.

Government by the People—for the People
Aims to Produce
The Greatest Good to the Greatest Number

Skip-Stop removes one-third of the car stops. ONE-THIRD of the Car Riders are inconvenienced. ALL of the Car Riders are benefited by rapid transit and low fares.

FIG. 10—FIRST AND THIRD PAGES OF FOUR-PAGE FOLDER DISTRIBUTED ON THE SKIP STOP

subsequent to the institution of the skip stop. The coroner testified: "I can frankly, freely and truthfully say there has not been any case up to the present time where it could have been charged directly to the skip-stop system."

President Mitten appeared in person at the hearing before the committee of thirteen and gave a complete outline of the whole skip-stop question. The following is a summary of his statement:

WHAT THE SKIP-STOP MEANS

By President Mitten

Skip-stop operation having been put in by order of the government, was installed in a hurried way. There was little time and no opportunity to select the stops properly—we were told that they should be six to the mile.

We found that there was a very great saving in coal to be made by the skip stop. We saw that it enabled a very great saving in time of men, in time of passengers on the cars, and that it would help us bridge the almost impassable gulf between reasonable service to the public and what we have been able to give pending ability to utilize the city's projected transit development, which at best we cannot hope to help us for some considerable time to come.

When the skip stop no longer was required as a war measure, we continued it as an economic measure. A campaign of misrepresentation designed to convict the skip stop of murder was begun, and the skip stop stood in the felons' dock accused of being responsible for many fatalities. The public mind was becoming so convinced. The management knew that skip-stop operation was now the only hope for increased capacity and quicker service and that it would go far to keep wages up and fares down, but so long as the public was misled into the belief that the skip stop was a murderous thing, maintained for the profit of the company, no reasonable consideration of its real merits could be expected.

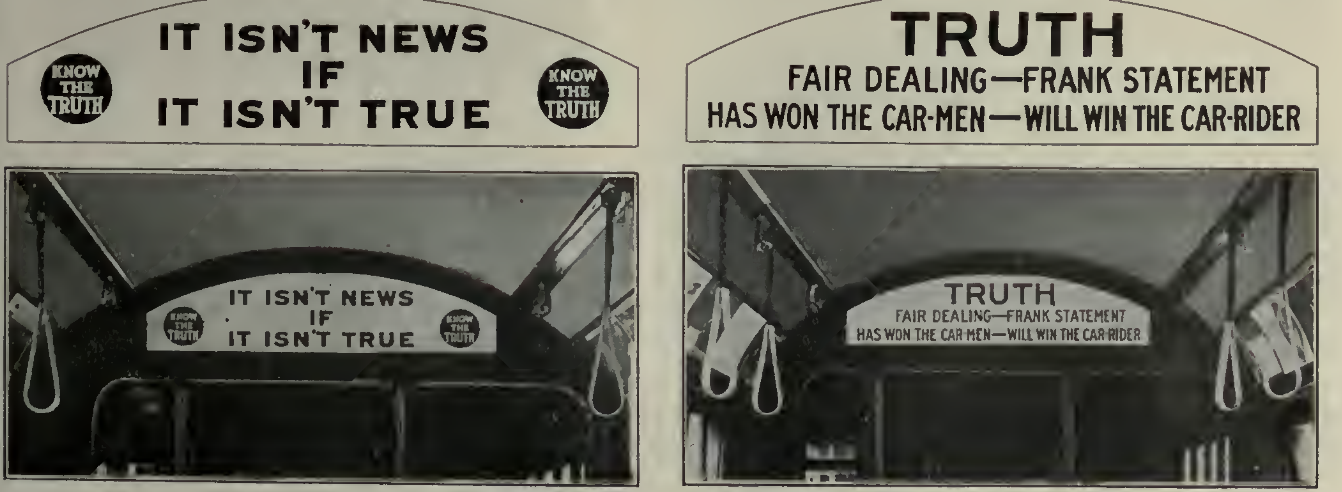
Hence, because Mr. Stotesbury is engaged in an endeavor to help Philadelphia by straightening out the muddle in which he found the Philadelphia Rapid Transit Company eight years ago and, because I am trying to carry out this idea, the committee of thirteen was formed in the knowledge that their influence, through the organizations they represent, and their positions and reputations in the community, were such that their findings in the matter at issue would be accepted by all fair-minded people as based on the evidence and facts.

The complainants were requested by this committee to appear in public meeting and support the charges. They failed to do so. Not one particle of evidence that the skip stop is responsible for a single accident was presented.

The conclusion that the skip stop is not responsible for fatalities or casualties is therefore clear, and fair-minded people can now thank this committee for the opportunity given by which the car rider can finally and without prejudice say if the skip stop shall go or the skip stop shall stay.

The problems confronting us are that we have crowded cars; we have slow service; we have long delays coming to work in the morning and going home in the evening; and we ask the co-operation of the car riders in helping us solve these problems for their benefit.

The city contract says that the Rapid Transit Company shall get 5 per cent per year on its $30,000,000 of capital actually paid in. It provides for increased fares as may


IT ISN'T NEWS IF IT ISN'T TRUE
KNOW THE TRUTH
KNOW THE TRUTH
TRUTH
FAIR DEALING—FRANK STATEMENT
HAS WON THE CAR-MEN—WILL WIN THE CAR-RIDER

FIGS. 9 AND 11—FINAL BULKHEAD SIGNS CARRIED ON THE SKIP STOP be necessary to meet the higher costs and still pay to the company the agreed 5 per cent. Not 1 cent more or less—just 5 per cent per year.

If the transit management did throw away a saving of more than $1,000,000 a year from skip stop operation without careful investigation and explanation, then the management would be both cowardly and incompetent, because the million, if wasted, must be added to the cost of your rides.

We are practically tho only city that is not already either demanding or collecting an increased fare. Boston is charging 8 cents. Pittsburgh 7 cents. All the little roads surrounding Philadelphia are going to 6, 7 and threatening 8 cents. Even Cleveland is now charging 5 cents with an extra penny for a transfer. *We are here endeavoring to hold the fares where they are, or at least as low as possible. We say nothing about trying to cut wages down when the soldiers come back. It will be our effort to keep wages up.*

You are interested in getting the best service that the money will buy. We are interested in giving you just that. Now, how are we going to bring it about? You, the car rider, shall say. But when shall you say? When we have shown you what we are driving at. Our duty now is first properly to place the car stops by a competent force of experienced engineers, who will consider all suggestions from citizens and business men's associations, addressed to Vice-President H. G. Tulley, Eighth and Dauphin Streets. Having accomplished the shortening of the time required to take you to and from your home, we shall then say to the riders on each line, "Do you want what you have now got or do you want what you had?" And upon their decision each line will either keep the skip stop, as we finally put it in, or go back to the old method.

FINAL EFFORTS IN CAMPAIGN

Concurrently with the appointment of the committee of thirteen and its public hearings, the company continued its campaign of publicity.

On Dec. 12 2,000,000 cards, one of which is reproduced in Fig. 8, were distributed in the cars. On one side of the card appeared the names of the committee of thirteen and on the other the statement shown.

From Dec. 24 to 27 inclusive there was displayed in the bulkhead spaces of all the cars the sign reproduced in Fig. 9. This sign was in answer to the plea of the newspapers that they had only printed the news of the day. On Dec. 26 the company distributed on all the cars a small folder headed, "Truth About the Skip Stop and the Stotesbury-Mitten Management." The first and third pages of this folder are reproduced in Fig. 10. The folders were distributed from a small metal holder located in each car near the exit door, within convenient reach of the passengers. A sign bearing the invitation, "Read the Answer. Take a card" was displayed in a frame suspended from the ceiling over the aisle.

Following the publication of the report of the committee of thirteen, all the bulkhead signs were, on Dec. 28, changed to that shown in Fig. 11. This slogan was carried on the cars until the hearing on the skip stop before the Public Service Commission on Jan. 29.

At the hearing before the Public Service Commission on that day less than twenty individuals were present to protest against the plan. The complaint of most of those who spoke was that the cars did not stop at the corner nearest their store or home. The commission pointed out the desirability of rapid transit, and at its suggestion the United Business Men's Association, which was represented at the meeting, agreed to appoint a committee to confer with the company's officials as to any change which should be made, the matter to be considered then later by the commission.

Later on the same day skip stops were considered by the Common Council, and the City Solicitor was asked to give an opinion whether the Council or the Commission had jurisdiction in the matter.

The Philadelphia Rapid Transit Company instituted the skip stop in several steps, beginning in July and extending into October, 1918, each section of the city being treated separately. The introduction followed a thorough field survey with the object of securing to the public the advantages of the skip-stop system with the least inconvenience to the car riders.

The elimination of unnecessary stops increased the average distance between stops from 480 ft. before the change to 720 ft. under the skip-stop plan. About one-third of the total number of previous stops were discontinued. Skip-stop operation, it is estimated, will, when in full effect and thoroughly adjusted, afford improved service equal to the supplying of 200 additional cars on the system and will save the car riders from five to fifteen minutes in their daily rides.

Attractive Display Box for Safety Bulletins

A NEW TYPE of display box for bulletins arranged with stereopticon slides at either side to attract attention is used by the Tacoma Railway & Power Company. The box, as shown in the accompanying illustration, is arranged for a bulletin in the center with three stereopticon slides on each side. A 300-watt lamp in the back of the box illuminates the bulletin and slides through a plate of ground glass which diffuses the light, distributes it evenly and eliminates glare. The box is painted dark green similar to the color of metal filing cases. The bulletin and slides are changed each week.

ILLUMINATED DISPLAY FOR SAFETY BULLETINS

Previous to the installation of this box the men showed little interest in the safety bulletins and would hardly read them, and it was a very difficult matter to get the trainmen together to present an illustrated lecture. This box has been placed prominently in the extra room at the trainmen's depot, where the men examine the slides and of course they read the bulletins. The design has been copyrighted by E. C. Clarke, former superintendent of instruction and efficiency.

Connecticut Lines Need Help*

If the Public Is to Have Electric Railway Service, It Must Recognize the Legitimate Needs of the Industry and Support It Properly

By L. S. STORRS
President The Connecticut Company, New Haven, Conn.

THE Connecticut traction situation at present is this: Two of the properties are in receivership and another property is only continuing in private control because of considerable revenue obtained from power and electric business. Another of the smaller companies is unable to pay its bills. One of the larger companies is in a position to escape receivership solely because of the personal pride in the continued operation of that property of the man who brought together under one control a large number of small units. And finally the largest property in the State has not been able to accumulate sufficient cash at the present time to pay its annual taxes to the State.

It takes but little thought to appreciate the full value of the electric railways to the State. The great development of the lines through the rural districts has been of great importance to the welfare of the State as a whole and has a direct bearing upon its industrial supremacy. It is doubtful if towns which now have electric railway service would care to go back to the days before the trolley rails were laid in their streets. These railways have made possible the development of industries in these small towns. They have brought about the development of real estate. They have linked the country with the city so effectively that the dependency of one community upon the other is more and more being realized.

To do this it has been necessary to build lines in many cases through sparsely settled territory. Mile upon mile of electric railway goes through territory that contributes but little revenue. If an abandonment policy were to become necessary—all, of course, hope it will not be—these country lines would, of course, be the first ones to be suspended. Such a suspension would be calamitous because there are not a few communities in Connecticut that are almost entirely dependent upon the trolley lines for easy communication with the outside world.

It has been possible for the cities to develop rapidly because the electric railways have been built into suburban territory and in many cases have preceded the coming of the householder and industrial plants. Were it not for this development, the growth of industry, business and commerce in large cities would have been very much slower. The new suburban construction thus created has a value of many millions of dollars, the taxes on which have made possible the improvement of the cities and towns themselves.

The investors in electric railways built the lines in the hope that eventually there would be a fair return upon their investment. It was the investment in these lines that created in a large measure the increased valuation of the cities and towns. Therefore, should there be a reduction in service, or a further destruction of incentive to invest in electric railway securities, there would naturally follow a slackening of community and industrial development.

DECLINING EARNING POWER OF CONNECTICUT COMPANY

On Oct. 31, 1914, the entire property of the Connecticut Company was placed in the charge of trustees appointed by the court in the suit for separation brought against the New York, New Haven & Hartford Railroad by the Federal Department of Justice. The trustees are directed to operate the property "solely in the interest of the Connecticut Company without regard to the interest of the New Haven company, but with due regard for the public interest." Since their appointment all their efforts have been given to carrying out this intent, and to this end they have authorized the application of all surplus funds to a continual betterment of the property.

As showing the trend of the gradual impoverishment of this system the following tabulation from annual reports to the Public Utilities Commission are illuminating. The figures are the net revenue of the property after the payment of operating expenses, taxes, fixed charges and rentals, but without the application of any of the revenue to a return upon the value of the property or interest upon the amount expended by this company in betterment of the plant:

1913	$1,609,021
1914	1,501,072
1915	1,323,457
1916	1,678,488
1917	619,848
1918 (approximate)	400,000

The great importance in keeping the equipment and plant in good repair and having an ample supply of coal so that there would be no possibility of interruptions to the service that would have the effect of slowing down any of the numerous war industries in the territory made it necessary to have a supply of materials for repairs and coal far in excess of the requirements. Payments for such materials and supplies have so depleted the cash resources that money has not been available to settle taxes and fixed obligations other than such as have been necessary to keep the property intact.

Since the independent control of its property by the Connecticut Company, the amount of revenue available for the payment of a return upon the value of the property has averaged only 3 per cent per year upon the fair value of all of the property, this return having dropped to below 2 per cent during that period. In the four years since the appointment of the trustees by the government, however, only $1,200,000 has been paid in the way of dividends to the New York, New Haven &

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*Abstract of address presented before the Connecticut Editorial Association at New Haven on Jan. 25.

Hartford Railroad, the owner of the stock—representing an investment by that company of $40,000,000. All surplus cash resources have been used for additions to or betterment of the plant, leaving absolutely no surplus from which any dividend could be paid during the last two years.

CREDIT MUST BE RESTORED

In order to obtain funds for development it is essential that the credit of the company be established. For some years the New York, New Haven & Hartford Railroad acted as the banker, advancing the necessary cash to meet capital obligations, but because of the dissolution proceedings it has no longer been possible to borrow from that source. The only money that has been available has been from the current income.

This diversion of the entire surplus current income to capital account, however, is unusual. It must, of course, be clear why new units of the utility plant should be paid for by the addition to capital account instead of from current income. In the first place, in order to provide the necessary cash from revenues the rates of fare would have to be materially increased, and then, too, any investment made at the expense of the car riders during any year would be for the benefit of those of future years. In the opinion of the regulating commissions the charge of the cost of additions to the property to current expenses would make possible exorbitant charges for the service rendered.

Briefly, the capital expenditures for additions to and betterment of the Connecticut Company property have averaged $2,000,000 per year since the purchase of the original lines. Owing to the inability to obtain funds, these items totalled but $700,000 in 1917 and still less in 1918. The company has been able to obtain the assistance of the United States Housing Corporation in the purchase of some new rolling stock and for a few track extensions, solely by reason of the fact that during the progress of the war the essential character of the transportation of munition workers was recognized. This loan has only postponed the day of reckoning, for the amount advanced will ultimately have to be repaid through the issuance of some sort of marketable securities.

There is a constantly accumulating list of essential betterments that will have to be provided if the property is to continue its proper function, but before loans can be made it is essential that full solvency may be assured. To be a recognized factor in the money markets the revenues of the company must be sufficient to pay all the operating expenses, taxes, fixed charges, depreciation allowance and a reasonable return upon the fair value of the property.

An essential to the consideration of the entire problem is the determination of the return upon the investment: First, what rate of return is a reasonable one to consider in fixing the amount of revenue provided through fare collections by the public? and second, what actual return must be made to the investor in order to induce the continued supply of funds needed to keep the plant up to an adequate capacity?

Numerous different expedients have been resorted to by the traction utilities all over the United States in an effort to stimulate the revenues by increasing the rates of fare. In no instance, however, has the resulting revenue even approximated the percentage in the increase in rate, and in most instances it has not produced an amount sufficient to even meet the increase in payrolls made necessary during these times.

Prior to Oct. 1, 1917, the Connecticut Company was operating on a 5-cent fare; on that date it was increased to 6 cents. The period since the increase has been one of intense industrial activity throughout the territory served. Almost all of the industries in Norwalk, Bridgeport, Waterbury, New Haven, Hartford, New Britain and surrounding towns were devoted to intense development looking toward the rapid production of the essentials of war. The actual results upon railway revenue from the increase in fare is no indication at all of the change in the riding habits of the community brought about by this industrial condition.

The passenger revenue for the first twelve months during which the 6-cent fare was in effect was $9,227,460, an increase of only $80,431 or less than 1 per cent. The contributing factors in connection with this are primarily the loss of so many men to active service in the army and the desire of the young women of the community to do their bit in the factories or offices, which eradicated the desire to continue those purely social activities upon which the pleasure riding was based.

Moreover, the financial necessities of the government have developed a spirit of thrift and saving heretofore unusual in this country, and unnecessary expenditures have been eliminated from the average family budget, thus automatically reducing the non-essential travel. During the summer months the company generally carries a large number of people to the shore resorts from the interior section of Connecticut, but last summer the conditions of the communities were such that the people did not take their usual shore vacation or even the one-day trip to such resorts. This was not due to the increased rate of fare, because the transportation item is such a minor portion of the expenditures necessary for a day's excursion, but was entirely due to a change in habits.

During the months of December, January and February last winter the conditions were so extreme that in some of the territory service was severely crippled, and the cold was so great that people did not move so freely within the community.

The inducement of high wages in the industries made it impossible to obtain the full complement of platform men, with the result that car mileage was reduced. This, of course, had a tendency to reduce revenues. In Bridgeport a contributing factor has been an intensive jitney competition which was fostered by the 6-cent fare, for while there were jitneys in operation prior to Oct. 1 there has been a great increase since that time, and the railway has lost very largely to that form of competition.

After having weighed all the various factors, I have come to the final conclusion that the increase to 6 cents has had the effect of increasing revenues about 10 per cent over what the company might have expected to receive had it continued to operate under a 5-cent rate.

Of these contributing factors the only one in which the public is deeply interested is that of jitney bus competition. At present this form of transportation closely follows the trend of traffic in the most congested portions of the cities, all of which was developed by the transportation agencies to meet the requirements of the various communities. Such competition cannot be to the benefit of cities in their development.

There may be a certain value to jitney service when properly regulated and controlled and more especially when used as a medium for extending existing transportation facilities. Within the limits of such needs the Connecticut Company can make no exception. When the jitneys are allowed to run in unrestricted competition, however, it is necessary to state clearly that the communities will receive an impaired trolley service which will ultimately be a great disadvantage to such communities and seriously retard their growth and the continued growth of their industries. There is no room for both methods of transportation in general service throughout any city, and jitney service is not capable of being developed to a point where all the transportation needs of a community can be provided.

Detailed Traffic Survey Being Made

Some months ago it became apparent that a readjustment in the rates of fare that would increase the revenues was an absolute necessity, this in addition to some measure of relief from burdens imposed upon the revenues, in order that the property might escape a more drastic readjustment with a possible abandonment of portions of its lines.

For the purpose of having at hand an accurate picture of the service conditions as well as the actual use made of the cars, we have had a most exhaustive survey made of the traffic, the results of which are being tabulated and on which basis a complete readjustment may be worked out. As I stated before the commission, "all the Connecticut Company wishes to obtain is a reasonable rate of return upon the value of its property, this to be obtained from a system of fares that will be most pleasing to the great majority of the patrons."

In discussing the requirements of the electric railways, the greatest emphasis should be put upon the requirements of public co-operation. The electric railway problem is no longer merely one of transportation. It is a state and community problem. The public must realize that unless it supports the electric railways, it simply cannot have electric-railway service. The public depends upon the street cars for service. The company depends upon the public for successful operation. Boards of trade, business men's associations, municipal bodies, the legislature and the Public Service Commissions are coming to realize that electric railway service deserves their earnest attention and helpful co-operation. Unless the public is willing to be fair, sooner or later it will cease to enjoy the benefits of electric railway service.

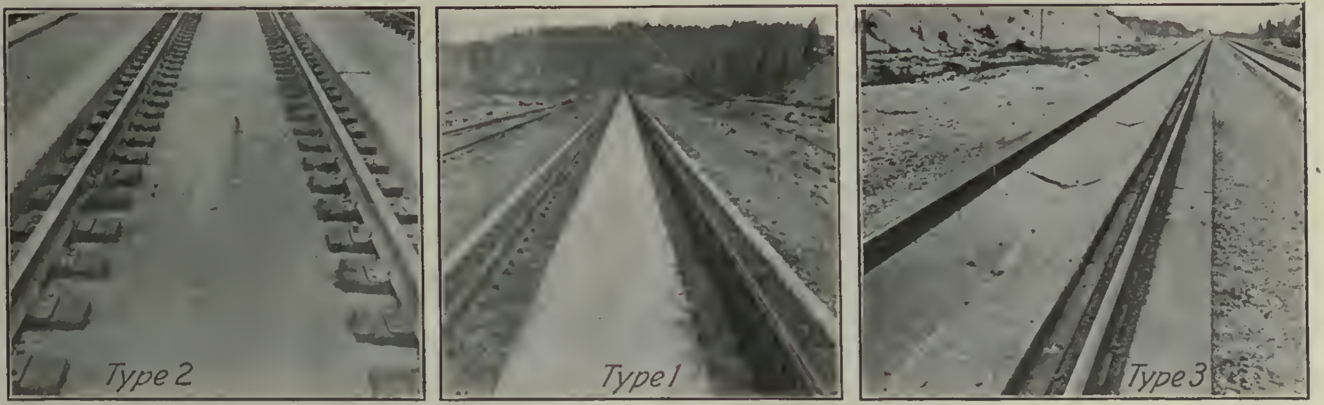
Five cents today does not go as far as 2½ cents went a few years ago, and it has been the unwillingness of the public to recognize that the electric railways cannot make 5 cents go farther than any individual can make it go that has brought the regretable situation the electric railways are now in.

To sum up the whole situation, one might say that, if the public is to have electric railway service, it must first of all recognize the legitimate needs of the electric railway companies. Having recognized them, it must be willing to give the industry proper support. It must be willing to pay the cost of transportation and a fair return upon the investment the electric railway systems represent. Instead of hampering them by severely restrictive legislation, it should adopt a liberal attitude, always retaining to itself the powers of regulation that now exist.

Concrete-Base Track on Steam Road

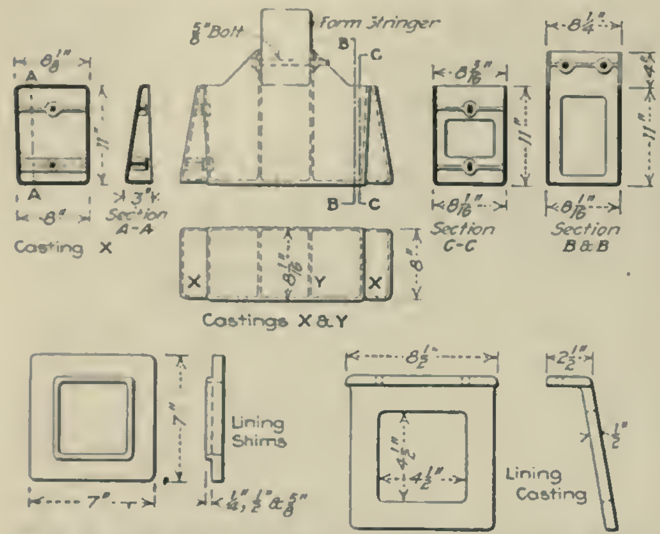
Northern Pacific Railway Has Short Experimental Section of Slab Construction Very Similar to That Used by Electric Lines

THE use of reinforced concrete ballast for main-line steam road track construction in the open country upon private right-of-way is a radical departure from accepted standards of steam road track construction. Nevertheless, it is interesting to electric railway track engineers because of the extended use of this construction for electric railway tracks. An experimental stretch of double track 2000 ft. long on the Northern Pacific Railway, using the types of concrete ballast construction shown in the accompanying illustrations, has been under test for more than four years with gratifying results. This experiment was reported upon briefly by the committee on ties of the American Railway Engineering Association at the convention held last March in Chicago and is described in detail in a recent issue of the *Engineering News-Record.*



NORTHERN PACIFIC RAILWAY IS EXPERIMENTING WITH CONCRETE-SLAB ROADBED DESIGNS

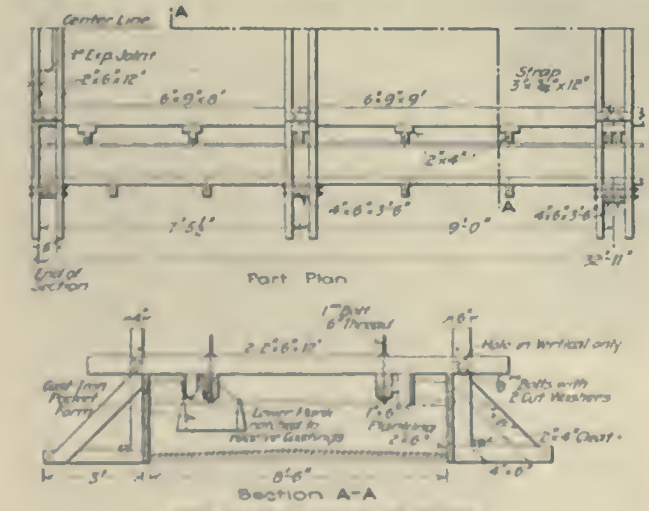
The experiment was conducted as a part of the original construction of a new line, and a good chance was had to make comparisons with the regular standard ballast type of construction under exactly the same conditions of traffic and other controlling factors. The experimental construction combines three variations of one general design, whose main feature is the use of a continuous reinforced concrete slab to support either wood blocks or stringers upon which the rails are laid.



IRON FORMS FOR POCKETS IN SLAB AND IRON SHIMS FOR RAIL BLOCKS

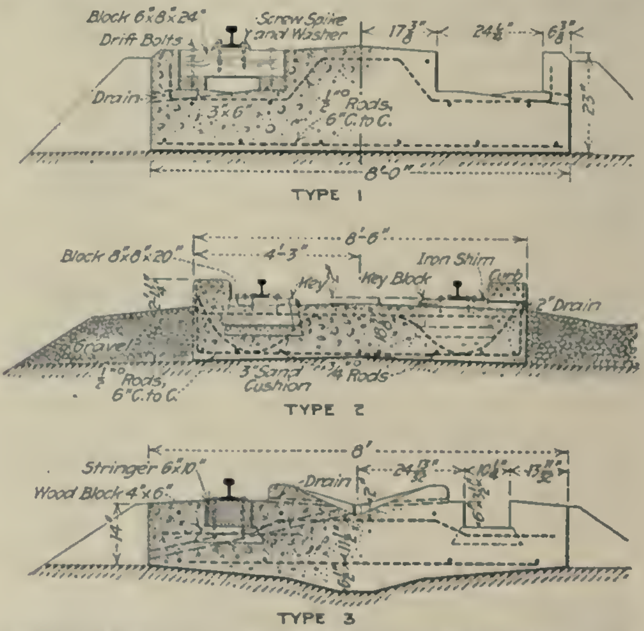
The use of wood is to gain resilience and cushioning effect in order to avoid the direct placing of rails on rigid concrete. The live load used in the design was a 26,000-lb. wheel load on two ties, with 100 per cent allowed for impact. Compression and shear in the concrete were assumed as 250 and 500 lb. per square inch respectively, and the tension in the reinforcing steel was taken as 12,500 lb. In two types, short wood blocks set in the slab form the rail support, while in the third, continuous stringers or sills were used.

The experimental construction is located in a wide, open cut upon a fair gravel roadbed, which was carefully leveled to grade and tamped before the concrete was placed upon it without the use of bottom forms. Very little settlement is reported, and where this occurred the construction extended out upon a fill. The slabs are from 8 to 8 ft. 6 in. wide; from 16 ft. $5\frac{1}{2}$ in. to 32 ft. 11 in. long and from about 18-in. to 24 in. thick. They were mortised at their ends, and expansion joints $\frac{9}{16}$ in. wide filled with hot 1:4 asphalt mastic were used as a seal. The mortise was used to prevent lateral shifting. Gravel was placed on each side of the slabs to assist in keeping them in line and to act as a protection for the subgrade.



FORMS FOR SLAB OF TYPE 2

The timber used for the tie blocks and stringers was creosoted fir, while tie plates were used with the blocks but not with the stringers. Screw spikes were used in all cases. The rails were 90-lb. A.R.A.—B section, 33-ft. lengths, with standard 24-in. angle-bar joints laid opposite. It is stated in particular that there has been very little wear on the timber stringers, not exceeding $\frac{1}{8}$ in. in depth, and thought to be due to compression of surface fiber. The rails crept some on the stringers, but this was stopped by cutting them at intervals and applying rail anchors which bear against the ends of the stringers. The concrete was 1:3:5 mix, using gravel of $\frac{3}{4}$ in. to $1\frac{1}{2}$ in. size for coarse aggregate.



TYPE 1

TYPE 2

TYPE 3

THREE TYPES OF CONCRETE SLABS FOR TRACK CONSTRUCTION ON NORTHERN PACIFIC RAILWAY

The costs are not reported, but as the section is comparatively short, it is presumed that they can be greatly reduced if the work is done on a larger scale. Each of the three types has given general satisfaction, but the type using the stringers has maintained the best surface and line, and all three types give a smoother riding track than the adjacent regular ballasted tracks. It is also stated that the cost of maintaining the sections so far has been only 5 per cent of that for the adjacent ballasted tracks.

The experiment was originated by W. L. Darling who was chief engineer in 1914 when the line was built. The designs were prepared by the engineering staff and are not patented.

The importance of this experiment will be appreciated as being perhaps the first attempt to use a type of construction upon open roadbed which has given good results in tunnels and at terminals on steam roads and in subways at stations, as well, of course, as in electric railway tracks in streets. The experimental sections so far constructed are said to be the most extensive as yet undertaken by steam roads.

Metallurgical Problems Met in Electric Arc Welding*

The Successful Welding of Steel, Malleable Iron and Cast Iron Depends on the Character of the Material and on the Skill of the Operation

LITTLE is known at present regarding the effect of impurities on weldability where the electric arc welding process is used. No data have been published on the subject. It is known, however, that steel containing 5 per cent or more of carbon is subject to "burning" at much lower temperatures than low-carbon steels. This fact can readily be observed in arc welding practice, *i.e.*, the tendency being toward "burnt" metal in the weld. The observations which have been made to date seem to indicate that the tendency toward "burning" shown in steels of comparatively high carbon content is the only considerable effect which is produced on weldability by the presence of impurities in usual amounts.

The welding process simply adds a certain amount of cast steel of a given composition. The metal added is usually in the form of a steel wire or bar which has been rolled. However, after it has been melted it cools into cast steel and the artificial structure produced by the rolling is entirely lost.

The rate of cooling of the metal in the weld is determined by the shape of the casting and by the manipulation of the arc by the operator. The rate of cooling may be different in different localities in the same weld, with a corresponding difference in character of the metal in different sections. This is, of course, more noticeable in the higher carbon steels than those which contain around 0.10 per cent.

The metallurgical problems met in the welding of steel plate are the same as those met in the welding of cast steel, so far as the character of the metal in the weld is concerned. In sheet metal, we have, however, a product which has passed through a process which improves its quality beyond that of cast steel, namely, the mechanical treatment in the rolls. The result of this mechanical treatment is greater compactness of the structure with resultant increase in toughness. The welded piece of sheet metal consists of two grades of metal—the original metal which has received mechanical treatment and the metal added by the welding process which has not received mechanical treatment. The metal added by the welding process has, in general, the characteristics of cast steel, and the original unmelted plate has the properties of rolled metal.

Up to the present time no cast steel has been produced which has all of the properties to the same degree as are found in any given piece of rolled metal. This limitation of any welding process in which steel is melted should never be lost sight of in welding.

From the foregoing several conclusions may be drawn: (1) The tensile strength of the cast steel in the weld may be made less than, greater than or equal to the tensile strength of the metal in the original section. This holds for commercial plate only. (2) The metal may be harder or softer than the metal in the original piece. The tensile strength of the metal in the weld varies with the hardness. Burned metal is neglected in this conclusion. (3) The elasticity of the metal in the weld is always less than the elasticity of the metal in the original plate.

CHARACTER OF WELD DEPENDS ON COMPOSITION OF WELDED METAL

The character of the finished weld depends on the composition of the metal being welded and upon the skill of the operator. The mere fact that the metal is melted and allowed to run into a joint does not indicate that the metals are welded, since it is easily possible to melt the metals without welding them. A weld is made when the metals to be welded are in the liquid state, with the slag and oxide floating on top. The simplest analogy is the case of welding together two pieces of pitch. While cold the pieces will not even adhere. Brought to the liquid state the two pieces merge into each other, and at the region of contact entirely lose their separate identities. Upon cooling, the joint is perfect. Now if the pieces of pitch be coated with paint (which corresponds to the oxide on hot steel), and the attempt is made to weld them together, it will be found that until the two pieces are perfectly liquid and the paint is floated out of the joint a perfect weld is impossible.

Flaws and imperfect welds in steel are due to the fact that the metals were not properly liquefied in welding, and the presence of the oxide, or slag, or both, prevents a perfect union. In autogeneous welding the actual union is made in plain view of the operator, so that if the union is not perfect he knows it. Knowing the tensile strength of the plate and of the metal added, the skillful and conscientious operator can predict accurately the behavior of a given welded piece under a pulling test.

The few failures of the process have been due, perhaps, to the fact that it is too easy to make an arc-welded joint which appears to have the same tensile strength as a riveted joint. The single-riveted lap joint is 55 per cent efficient under the most favorable conditions, while the quadruple-riveted, double-strapped joint may have an efficiency as high as 85 per cent. A skillful electric arc welder will make a joint which has an efficiency of 90 per cent without particular effort. Stiffness equivalent to that of the riveted joint may be produced by making the section of the joint greater than that of the unwelded section, or by the use of alloy steel electrodes.

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*From the 1918 report of the committee of the Association of Railway Electrical Engineers. For other articles on the same subject, see issues of this paper for Dec. 7, 14, 21 and 28, 1918; also Jan. 11, 18 and 25, 1919.

An intelligent analysis of the problems encountered in the service required of a given joint, together with an application of established welding methods, will leave no excuse for the failure of a joint which has been calculated to hold. The intelligent welder does not guess; he knows what the joint will do.

The failures of the past have been due to ignorance and to haphazard application, and not because the results which are obtained from the arc welding process are uncertain.

METAL ELECTRODES USED FOR WELDING STEEL

Practically all sheet-metal welding, where metal is added, is done by the metal-electrode process, although the carbon electrode may be used on plates over ½ in. in thickness in certain applications. At present two kinds of electrodes are in general use on sheet metal work; Norway or Swedish iron (or their American equivalent) and carbon-steel wire. The iron wire gives metal in the weld of a tensile strength of approximately 48,000 lb. per square inch, while the steel of the 0.10 per cent carbon content may be relied upon to produce metal in the weld of a tensile strength of about 50,000 lb. per square inch. On plates of ⅛ in. thickness and less, an electrode of $\frac{1}{16}$ in. to $\frac{3}{32}$ in. in diameter gives the best results. A current density in the circuit of not to exceed 75 amp. should be used with this small electrode. Plates between ⅛ in. and ⅜ in. thick are usually welded with electrodes ⅛ in. or $\frac{5}{32}$ in. in diameter, with a current not exceeding 125 amp. for the ⅛-in. electrode, and 155 amp. for the $\frac{5}{32}$-in. electrode. Plates thicker than ⅜ in. are usually welded with $\frac{3}{16}$-in. electrodes, using a current of approximately 175 amp.

Iron electrodes may be melted more rapidly than steel electrodes, and have less tendency to burn than the steel. In general, however, it is more difficult to weld with iron electrodes than with steel. To get the best weld possible with any electrode, the current density in the circuit should be kept as low as is consistent with a usable arc.

Practically no applications of the electric arc process have been made on plates having a thickness of less than $\frac{1}{16}$ in. where a butt joint is required. This is due to the great intensity of the heat with the consequent tendency to "burn through." In the case where the edges of the plates are in parallel planes, however, they may be melted together with a low current carbon arc with excellent results.

The application of the electric arc-welding process to the welding of steel forgings is in every way similar to its application to boiler plate and structural shapes. This is due, of course, to the fact that forgings belong to the same classification, namely, metal which has had mechanical treatment. The metal added by this process is cast metal and has a lower degree of elasticity than the metal in the forging.

ANNEALED SECTIONS OF MALLEABLE CASTINGS ARE WELDED

The correction of flaws in malleable castings by the electric arc process effects very large savings. The welding is always done after the casting is annealed and made malleable. The annealing usually affects the casting to only a small depth, and it is in this annealed or softened section that the welding is done. The annealed section is essentially low-carbon cast steel. The work may be done with either the carbon or metal electrode process, depending on the size and shape of the casting. Due to the thinness of the annealed section a comparatively low current density is used on the carbon electrode. The electrode in the hand of the operator is sometimes made the positive electrode in order to reduce the effective heat on the casting.

If the casting is to be machined in the welded section it is reannealed. This is usually necessary owing to the fact that the heat of the arc will in effect reverse the annealing process; that is, the carbon which was thrown out as graphite by the annealing is dissolved in the iron again when the metal becomes molten in the heat of the arc. The carbon in combination with the iron will of course make the casting hard.

SATISFACTORY WELDING OF CAST IRON IS UNCERTAIN

Cast iron is difficult to weld by any process under the most favorable conditions, due to its brittleness and low tensile strength. No reliance can be placed on a piece of cast iron which has been welded. The welded joint in cast iron may hold, but there is no way known at the present time by which the strength of the welded joint can be accurately predetermined. Cast iron can be welded by the electric arc process about as well as by any other process, but the results are always uncertain.

Cast iron should never be welded unless the person ultimately responsible for the work has a full knowledge of the facts as outlined above and a thorough appreciation of the uncertainty of the results. Broken cast-iron parts, such as cast-iron wheel centers, etc., have been successfully welded with the metallic arc by applying what may be termed a mechanically welded patch. The edges to be joined may or may not be beveled. Half-inch or ⅜-in. holes are drilled and tapped along the edges in which studs are screwed and allowed to extend out of the casting approximately ¼ in. The studs should be staggered to give the best results. The casting should always be preheated to remove the chill, and if there is no danger of distorting the parts, better results may be obtained by heating the casting almost to a cherry red.

CAREFUL WORKMANSHIP WILL PREVENT FAILURE

In the general application of welding processes to parts of machines which have within them possibilities of death and destruction in case of failure of the welded part, too much caution cannot be given the operator. Owing to the fact that in the case of electric arc welding the work is done in plain view of the operator and he is competent to judge the nature of the completed job, disastrous failures may be prevented by the exercise of ordinary judgment.

The field for the electric welding process on railways is almost unlimited. The process can be made use of in the motive power department, the car department and the maintenance of way department, in a very extensive manner, as well, of course, in any other industry that makes use of iron and steel. Thousands of dollars worth of material is scrapped by railway departments every year, a huge proportion of which could be reclaimed at slight expense by electric welding.

Rust Prevention as a Steel Conservation Measure

The Writer Gives His Experience in Removing Rust from Steel Cars and Preventing Its Spreading to a Damaging Extent

By Denis O'Brien
Foreman Painter Fresh Pond Repair Shop
Brooklyn Rapid Transit Company

THE importance of planning for the reconstruction period which is now about to start has long been recognized. It is evident that the great demand for steel will continue and that we shall need to conserve the supply which we already have. One method of aiding in such conservation is by instituting a vigorous anti-rust campaign.

The first step in such a conservation policy must be the re-education of the painter. He must be taught the evil that exists in allowing rust to be formed, he must be taught how to combat it and, finally, he must be made to realize that the burden of responsibility for its existence is directly up to him. Next, extreme care must be exercised in the selection of good paints. The old idea that "any old" paint will serve the purpose is wrong; instead of applying a streak of color, as was the former practice in painting steel, we must treat the surface to a mass of pigment.

Spennrath says with regard to rust and its origin: "Chemistry shows us that rust is a hydrated oxide of iron, a compound of the metal iron with oxygen and water, 100 parts of dry iron rust containing 52.2 parts of iron, 22.3 parts of oxygen and 25.5 parts of water."

The water is here in a state of chemical combination and not present as a mechanical adjunct in the form of moisture. Consequently iron exposed to the air cannot rust in the absence of water, and iron immersed in water must remain free from rust if access of oxygen is prevented.

I have seen a greater formation of rust on a piece of steel plate exposed to a brief shower of rain, than on a piece of steel plate completely immersed in water for an entire day. If rust were a solid, and formed a compact coating over the steel, we could ask for no better protection; but instead of being solid, it is porous and, being porous, it absorbs and retains water and condenses oxygen, thereby creating more rust.

SMALL SPECK OF RUST MAY CAUSE LARGE EXPENSE

Let us figure if we can the cost of a speck of rust. Let us assume that on a steel plate of a car shopped for overhauling and painting the painter discovers a speck of rust ½ in. in diameter, and let us further assume that the painter has not been educated as to the evil possibilities of rust and that he works along the old line of theory that "paint kills rust." He removes the loose scale by scraping and then applies the paint. However, underneath that thin film of paint small particles of rust are left and they continue to multiply. The next time that the car is shopped we find that the ½-in. speck of rust has developed to such an extent that it becomes necessary to remove the affected plate and to install a new one. The initial cost of killing the rust (labor and material) would not have exceeded 10 cents. The final cost in this case would be the cost of cutting the plate away from the car body together with the cost of a new steel plate and cost of installation. Does it pay?

There is no better method of preparing a steel surface about to be painted than by sand blasting, but every shop is not equipped with sand-blasting apparatus. This method is economical only where the old paint is to be removed entirely and the car "brought up" from the foundation. Where the car is shopped for repainting, re-enameling or varnishing, it would not be of any advantage to sand blast the few specks of rust that might appear on the car body. In this case there is no better method for killing the rust than by applying sulphuric acid, after which the rust spot should be washed off with milk of lime. I have obtained excellent results by washing off the acid with caustic soda solution. After the surface is perfectly dry the steel can then be painted, but care must be taken to see that the acid is thoroughly removed and under no circumstances should the paint be applied to a damp surface. When we are certain that the steel contains no rust we can proceed with the painting. Unlike wood, which will absorb oil or varnish, iron and steel are impenetrable to them. We must therefore be positive that the paint used will adhere perfectly, and it must also be elastic enough to withstand the expansion and contraction that the steel undergoes due to the weather elements.

ROUGH SURFACES TAKE PAINT BEST

I have found the best surfaces to paint are rough or pitted, rather than polished ones, since the paint cannot penetrate the steel. A rough or pitted surface insures adhesion. The particles of pigment will find lodgement in the depressions of the steel and offer an excellent foundation upon which successive coats can be built up. I do not know of any better pigment for the priming of steel or the retarding of rust than pure unadulterated red lead. The vehicle should be pure raw and boiled linseed oils. Under no circumstances should turpentine be used as this, while rendering the paint more workable, destroys the value of the linseed oil. For the same reason japan driers should never be used, as they are an oxidizing agency. An objection to red lead may be its color, but I do not know of an instance where red lead has failed.

Iron oxides, while not possessing the good drying qualities found in red lead, make excellent paint, the only objection to them being that they can only be had in dull and dark colors such as reds, browns, blacks and slates. It is wrong to reject iron oxides as pigments on the ground that they produce rust, for when suspended in oil an oxide can neither condense oxygen nor absorb water.

RUST IS A CANCER

Rust is a "cancer" on the steel plate, and if it is not removed will permeate the entire plate and ultimately destroy it. Unlike the cancer that attacks the body and for which there is no remedy, the cancer that attacks steel and iron in the form of rust can be conquered with good workmanship, common sense, good oils and pigments.

A pigment that suspends feebly in the vehicle is not worthy of the name of paint. Lamp black, having practically no suspension, belongs in this class. If we take the weight per cubic inch of the pigments we can get an idea of the relative numbers of particles of pigment that should be obtained from them. These unit weights are: Red lead, 0.20 lb.; white lead, 0.13 lb.; iron oxides, 0.10 lb.; lamp black, 0.06 lb. From these figures we see the true relative value of red lead. Second to it is white lead, of which Dr. A. Landolt says: "White lead, used alone and in a pure state, is not a good paint for iron work. Apart from the fact that the pure white of the pigment will speedily become impaired and dirty, the paint also sets very hard in a short time, the elasticity disappears and cracks are formed."

White lead is thus eliminated from the field unless it is used with other pigments, leaving us the alternative of using red lead or iron oxides. I give the lamp black figure simply for comparison with the others to show it has no value as a paint.

AMERICAN ASSOCIATION NEWS

T. & T. Association Drafts Plans for Coming Year

AT A MEETING of the executive committee of the Transportation & Traffic Association held in New York on Jan. 28, plans were drafted for the coming year. There was a good attendance of officers and members of the executive committee, those present being L. C. Bradley, Houston; W. H. Collins, Gloversville; R. P. Stevens, New York; L. H. Palmer, Baltimore, and G. T. Seeley, Chicago. R. R. Anderson, Providence, and E. B. Burritt, secretary, were also in attendance. Mr. Seeley was formally elected a member of the committee in place of H. B. Potter, of Boston, resigned, and resolutions were passed regretting the resignation of Mr. Potter and inviting him to attend meetings of the committee, whenever possible, in an unofficial capacity.

In connection with the program for the October convention the decision was reached that the association would discuss only a few topics this year with the idea that sufficient time could thus be had for a more thorough consideration of each topic than would be possible with a longer program.

There will be three sessions of the convention, and it was decided that on two of these, only one report would be presented. On the third day it is expected that two reports will be considered so that the convention of the association this year will be devoted practically to the discussion of only four reports.

The subject selected for one of the sessions is the collection and registration of fares, particularly fractional fares or fares whose payment involves the collection and registration of two or more coins. It is hoped by the committee that this session will be made a joint session with the Accountants' Association, so that the topic may be considered from both the transportation and accounting standpoints. The committee will be instructed to consider the subject both as regards a uniform and a zone system of fares.

The subject selected for the other full session was "Operation of One-Man Cars From a Transportation Standpoint." It is hoped, at this session, to show a series of moving pictures illustrating the operation of one-man cars under different conditions in city service. An offer to prepare such a series of pictures has been received from a group of manufacturers. It is believed that such views will not only be of great interest to railway managers whose companies have not introduced one-man operation, but they will afford a very easy way of explaining to public authorities and others the many admirable features of the safety car.

The topics to be presented at the third session are (a) a report on the proper form of contract between city companies and interurban companies for the use of city terminal facilities and (b) a code of traffic principles designed to promote reliability of electric railway schedules.

It was decided to appoint two members of the executive committee to be sponsors for each of the four topics selected. The appointments made were: (1) Messrs. Stearns and Palmer; (2) Donecker and Stevens; (3) Collins and Seeley; (4) Dempsey and Bradley.

Chicago Section Contemplates Course in Public Speaking

AT THE MEETING of the Chicago Elevated Railways company section held on Jan. 21 a plan was outlined for organizing a class in public speaking and quite a number signified their intention to become members should the plan be carried out. H. A. Johnson gave an interesting summary of what had been accomplished through the first year's operation of coasting clocks, the results obtained having been exceedingly gratifying. G. T. Seely followed with a brief talk on his work while connected with the Emergency Fleet Corporation, illustrating his remarks with lantern slides and colored posters. Capt. M. W. Bridges described briefly his experiences in the European war up to the time of his injury and told of the excellent hospital care that is given the wounded.

Among items of business, program and membership committees were appointed. The audience sang patriotic songs and J. H. Mallon told some amusing stories. The meeting was attended by 125 members and guests.

Detroit United Railway Adds New Compressor Equipment

The Detroit (Mich.) United Railway is installing, at various carhouses, eight new type Q-3-VD National air compressors, made by the Westinghouse Traction Brake Company with a displacement of 400 cu.yd. of free air per minute as part of its storage air-brake system. These are being located at the larger stations, and the smaller units which they replace, of a displacement from 50 to 125 cu.ft. per minute, will be transferred to smaller stations.

The new machines do not take up as much floor space as the old 50-ft. units, and are a modification of the standard machine to fit local conditions. They are of the two-stage, compound type and are designed to operate against a 325-lb. mean pressure. Each compressor is driven by a Westinghouse 125-hp. type SK-190, 550-volt motor, and it is equipped with type HP (hydro-pneumatic) automatic control.

Recent Happenings in Great Britain

England Points the Way in Reconstruction Both With Respect to Labor and in Preparing for Foreign Trade Expansion

(From Our Regular Correspondent)

The industrial situation in England at the end of the past year was intensely interesting. On the one hand we had the efforts on the part of employers, capitalists and financiers for a great expansion of business, partly to make up for the arrears of work accumulated during the war, and partly for the inauguration of new developments. On the other hand, we had the constantly growing demands of labor for higher wages and shorter hours. With few exceptions, these demands were granted frequently in whole, though sometimes in part.

LABOR'S POWER MAY CONTINUE

Under the stress of war necessities, labor got things all its own way and the signs are that this increased power of trade unions is going to continue and the employers are going to be far more at the mercy of their work people than ever they were before the war. How far the expansion of industry is to be compatible with steadily increasing wages and large reductions in the number of hours worked per day or per week is a problem of enormous difficulty.

In the case of producing industries it may be solved in part, at least, by an increased use of machinery and by the workmen working for all they are worth during their shortened hours. But these remedies are not applicable in the case of transportation industry so far as the traffic staff is concerned. There the only visible remedy is increase of fares.

As regards the expansion of business, preliminaries are in full swing. The releasing of leading essential men from the army has begun, and during December there was a stream of government notices removing restrictions on business which had been imposed during the war. Freedom is coming to manufacturers, and in this direction the iron, steel and electrical industries are already benefiting. The whole elaborate system of priority and licenses in manufactures is going; so are the restrictions on imports and exports. Though the release of men from the army must be gradual, some help is at hand by the release of men from munition works.

MANUFACTURERS ON THE ALERT

Manufacturers for the traction industry are already advertising that they are prepared to take orders. The first two instances since the war of considerable orders being actually in the market come from Liverpool and Sheffield. The tramways committee of the former city have determined to order 100 motor omnibuses for the purpose of augmenting the services given by their tramways. It appears that, meantime at least, it is easier to get new omnibuses than new tramcars, and apparently the former will to some extent at least run on routes where there are no tramways. To get parliamentary authority to lay new tramways would take a considerable time, and to construct them afterward would take more. Meantime, that need is urgent, and it can be met temporarily as soon as the omnibuses are ready. The Sheffield City Council is apparently in less hurry, or it may have got promises of early deliveries. The Council there has invited tenders (which must be in by Jan. 7) for the supply of fifty double-deck, top-covered, vestibule tramcars.

On the manufacturing side the great immediate development now talked about is that of Dick, Kerr & Company, Ltd. In recent time that firm has acquired or become affiliated with the businesses of the United Electric Car Company, Willans & Robinson, Siemens Brothers, the Coventry Ordnance Works, etc., and is thus able to undertake practically any kind of engineering manufacture in addition to its production of electrical machinery. The facilities for the latter are also much increased.

DICK, KERR & COMPANY EXPANDING

The firm has established in France and Japan companies to exploit its manufacturing rights in connection with apparatus for railways and tramways. The affiliation with the Coventry Ordnance Works, which is the latest "deal," is very important. These works, it is expected, will be devoted to the production of heavy electric machinery. The Coventry Ordnance Works is not a public company, but is owned by the world-renowned firms of John Brown & Company, Cammell Laird & Company and the Fairfield Shipbuilding & Engineering Company. In pursuance of the expansion policy there was registered in December a new concern called the English Electric Company, Ltd., with a nominal capital of £5,000,000 in £1 shares (£1,500,000 preference and £3,500,000 ordinary). The shareholders of Dick, Kerr & Company and of the Coventry Ordnance Works will exchange their holdings for shares in the new company. The names of the first directors of the new company are instructive and significant. They are: C. T. Cayley, chairman of Dick, Kerr & Company; B. A. Firth, chairman of Thomas Firth & Sons; W. Rutherford, managing director of Dick, Kerr & Company; J. Sampson, director of John Brown & Company; P. J. Pybus, managing director of the Phoenix Dynamo Company; Col. J. H. Mansell, managing director of the Coventry Ordnance Works; A. Gracie, Fairfield Works, engineer; W. L. Hitchens, chairman of Cammell Laird & Company; and C. E. Ellis, manufacturer, Nottingham. The offices are at 3 Abchurch Yard, London, E. C., a building which is now occupied by the head offices of Dick, Kerr & Company. It is hardly necessary to point out that great developments are indicated by the above facts.

Other engineering firms also contemplate developments as indicated by the issue of additional capital. Recent examples are the British Westinghouse Company, the Morgan Crucible Company and the Mond Nickel Company.

GOVERNMENT YIELDS TO MEN

As to labor, the government, which now controls British railways, has recently yielded to a demand by the two trade unions of employees for an eight-hour working day. With respect to tramway employees, the position is uncertain. Efforts have been in progress for some time for the formation of a joint industrial council of employers and employed to embrace all the tramways of the country, but so far without success. Some of the employees are said to be recalcitrant.

Councils of this sort have within recent months been formed in a number of industries and much is expected from them in the way of settling disputes and preventing strikes. The Councils are composed of representatives of employers and employed and are the outcome of a report by a Parliamentary committee (called after its chairman, the Whitley committee) recommending such councils as a means of promoting industrial peace. Meantime trade unions connected with the tramway industry are formulating impossible demands.

Another example of the labor position is indicated by the fact that apparently the tramway services in a larger number of towns than ever before were suspended on Christmas Day. The suspension does not take place because the town councils or companies concerned wish it, but because the employees refuse to work on that day. For the first time on record there was a Christmas suspension on the London County Council Tramways. The men wanted the whole day off, but a compromise was reached under which the cars ran until 4 o'clock in the afternoon. The public inconvenience in London was specially marked because the distances traversed by the cars are exceptionally long.

TRAMWAY SERVICES INADEQUATE

In regard to the inadequacy of existing tramway services all over the country, there is no present prospect of improvement, as the coal controller states that supplies of fuel will not for some time permit of the relaxation of the present rationing. Miners are being released from the army to come back to the mines, but the demands for coal from Britain's allies on the Continent remain unabated, and the returned miners will not for some time be able to make their influence felt.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION .
PERSONAL MENTION

Valuation Base Accepted

Buffalo Figure Placed at $22,792,759 in Negotiations for Service-at-Cost Arrangement

An agreement has been reached between the International Railway, Buffalo, N. Y., and the municipal authorities on the physical valuation of the company's property within the city of Buffalo as of Dec. 31, 1918. The amount fixed as the base is $22,792,759. This sum will be used by the board of arbitration to be appointed soon after Feb. 24 as a basis of a permanent agreement whereby the city will establish control over the company's property similar to the plan in effect in Cleveland.

Arbitration Provided

The resolution which was passed by the City Council on Jan. 25, affirming action previously taken in committee, submits all questions in dispute between the company and the city to a board of arbitration. Under the commission charter, the resolution cannot become effective for thirty days. It is subject to referundum, and petitions are now being circulated so that the voters may again be called upon to affirm or repeal the action of the Council.

Values of intangibles claimed by the company are to be arbitrated. As allowed they are to be added to the figures agreed upon by the city. From the amount agreed upon is to be deducted the amount of depreciation where the arbitrators determine depreciation exists. The city claims depreciation of about $7,000,000. E. G. Connette, president of the company, says this sum is excessive.

Neither the city nor the company will be bound by the decision of arbitrators. Should the Council feel that the valuations found by the board are too high, it will be at liberty to reject the whole procedure. If the company feels the figures are too low, it has a like privilege. One member of the board will be selected by the city; the second by the company and the third will be chosen by these two. If no agreement can be reached, the umpire will be designated by outside parties.

Fare Matter Still Pending

Decision has been reserved by the Supreme Court at Albany, N. Y., on the application of the International Railway for a writ of mandamus directing the Public Service Commission for the Second District to receive the company's answer to the proceedings started before the commission several years ago by the city in an effort to bring about an investigation, which, at that time the municipal authorities thought would result in a 4-cent or 3-cent fare. Arguments were heard in Albany on Jan. 25.

The railway is seeking to bring the fare question before Public Service Commission. If the court decided that the commission must receive the company's answer and thereby assume jurisdiction in the rate case, despite the franchise limiting the company to a 5-cent fare, the arbitration agreement between the city and the company will probably be waived until the final determination of the case before the commission.

The municipal authorities contend that the commission has no jurisdiction when the company is bound to give service under a 5-cent fare franchise with the city.

City and State Consider Relief

The financial condition of the Rhode Island Company, Providence, R. I., is being considered by city and State authorities and it is possible that one or the other will in the near future propose a plan for helping the company.

At a meeting of the committee on Rhode Island Company affairs of the City Council, it was voted to extend an invitation to the United Traction & Electric Company to send representatives to a meeting of the committee to discuss the present condition of the Rhode Island Company and ascertain whether there is any common ground upon which the city and company can meet in an attempt to solve the street railway problem. While no definite action was taken, the committee also considered a bill presented to the Council providing for the presentation to the Legislature of a plan for the reorganization of the company with a view particularly to the simplification of the corporation structure. Governor Beeckman and leaders of the State Legislature are opposed to any plan providing for State ownership or operation of the street railways. The Governor said recently:

> There is nothing more that the State can do for the Rhode Island Company. We are ready to do everything in reason, but we can suggest nothing more and neither can the company. Reorganization is the only remedy. It is bound to come sooner or later. If it is to come now, so much the better.

Representatives of the New York, New Haven & Hartford Railroad which owns the capital stock of the Rhode Island Company, have been in consultation with officers of the United Traction & Electric Company for the purpose of establishing a basis for a revision of present leases, but to date nothing has materialized.

B. R. T. Policy Stated

Receiver Reviews Obligations of the Company as He Sees Them—No Room for Half-Baked Remedies

At a luncheon of the Bond Club at the Bankers' Club, New York, N. Y., on Jan. 24, Lindley M. Garrison, receiver of the Brooklyn Rapid Transit Company, said that the new management realized that the organization was a public service corporation, a quasi-public institution, and that its primary duty was to the public. In this connection he said in part:

> Now, as to the policy to be pursued by the court and the receiver, of course I can speak only in generalities. We have, as you know, of course, but one single policy in all that we do. We realize that this is a public service corporation, a quasi-public institution, and that its primary duty is to the citizens, to the public; and, of course, we intend, to the fullest measure that the facilities admit, to devote them to the best possible service that can be given to the public. We realize that in doing that we are serving our trust, because the other obligation of the trust is to the people who have put their money into this property, who have financed it, and who are entitled to proper treatment of their investment.
>
> We have to work through and with and under the city authorities, both the Public Service Commission and the Board of Estimate, and, of course, our purpose is to work in absolute harmony with them. We do not purpose to start out with good intentions and then run amuck, by which I mean to put into effect any half-baked theories, or half-thought-out remedies.
>
> We hope, therefore, that those who are interested, and that practically includes everybody, will endeavor in every way that is in their power to sympathize with our difficulties, and to hearten and cheer us on our way of progress when we are headed in the right direction, and I, for one, have very little, if any, fear that eventually the dark clouds that now overshadow the situation will not turn out their silver linings, and the situation will turn into one of great promise for the future.

In explaining the system of financing that brought about the need for seeking the protection of the court through receivership Mr. Garrison said:

> In so far as the present situation of the company is concerned, it is attributed to a policy which has been pursued for many years, by which the parent company, out of income that it received from operating revenue, has spent that money for betterments and improvements, capital expenditures for the subsidiaries, taking therefor their certificates of indebtedness, and not floating in turn from their own resources, bonds or stock or other means of raising capital to replace that money. It has on hand to-day some $37,000,000 of these certificates of indebtedness, and when it was faced with the necessity of making capital expenditures, almost wholly capital expenditures, amounting to $16,000,000, which we have got to have to complete the obligations of the company in respect to the subway contract, and to complete its own roads on account of the arrangement with the Public Service Commission and the city, they were in no position to market their securities—the market was in no position to absorb any security that they might put out—and they were face to face with a stone wall, and had to seek the protection of the court.

Frederick P. Royce, the new general manager of the company, has entered upon his duties. It is announced that John J. Dempsey, vice-president, will retain supervision over transportation.

Blocks Philadelphia Rapid Transit Lease

Commission Objects to Financial Agreement with City and to Lack of Valuation to Fix Fair Initial Rate

The rejection of the Philadelphia rapid transit lease by the Pennsylvania Public Service Commission has blocked for at least the time being the program for the operation of the new city-built lines by the Philadelphia Rapid Transit Company. Embodying features which the contracting parties accepted as being in accord with the latest and best thought concerning utility operation and control, the lease as a whole was generally believed to warrant adoption.

FINANCIAL CONDITIONS OPPOSED

From the explanation given by the commission for its action—this was briefly noted in the ELECTRIC RAILWAY JOURNAL of Jan. 25, page 199—it appears that the lease was disapproved for two primary reasons—first, because the commission disagreed in regard to some details of the lease, and second, because it felt that the city and the company had not reached a proper agreement as to fundamental financial conditions.

The commission's attitude on this second point calls for further mention. The gross revenues of the unified company and the city property, it will be recalled, were to be used for the following payments in the order named:

1. Operating cost, maintenance and damages.
2. Taxes.
3. Company fixed charges required by mortgage, lease or contract.
4. Interest and sinking-fund payments on new securities, and dividends and sinking-fund payments on new capital stock of company.
5. Depreciation reserve funds.
6. Sinking-fund payments under 1907 contract; payments to city for taxes on dividends to stockholders of subsidiary lines, and payments under 1907 contract in lieu of paving, snow removal and car licenses.
7. Payments to the city and the company in proportion to the relative investment of each equal to a return of 5 per cent per annum, the company's investment being fixed at the par value of capital stock issued, $30,000,000, less any unpaid installments.
8. Payment to city equal to the difference between the 5 per cent paid to the city and the total amount of interest and sinking-fund charges on its investment in transit facilities.

It was provided further that all these payments should be cumulative. In the case of the first five items payments should be cumulative in the order named and should be made before the application of gross revenue in subsequent years to current payments. But deficits in Items 6, 7 and 8 should not be made up out of subsequent gross revenue until all current payments in any year were made and the initial surplus restored, and then any deficit in Item 7 should be made up before deficits in Items 6 or 8.

The commission objected to this arrangement, however, upon the ground that the payments to the city under Item 6, now amounting to nearly a million dollars a year, should be paid before any dividends were declared and should not be "postponed." That the priority of Item 7 would exist only in an emergency period and that even then the city could receive a return commensurate with the company's dividends apparently did not in the commission's mind justify any concession on the city's part. It was asserted that the 1907 contract specifically prohibited any preference for dividends over the sinking-fund payments, although the commissioners elsewhere were quick to assert their refusal to approve even by indirection the 1907 contract.

Moreover, the commission alleged that the very right of the company to a 5 per cent dividend on $30,000,000 of stock had not been established. This phase of the case relates not only to the objections made against the financial arrangement noted above, but also to those presented against the rate-making basis of the lease. The commission on the latter point objected to the adoption of a fare revision plan without a valuation to determine the proper initial fare. This idea was brought out in various ways. For example, the main report said:

"We cannot approve of the method proposed for increasing or lowering the rate of fare. To do so would in effect be determining that the initial rate is just and reasonable. This the commission declines to do except in accordance with the methods and upon consideration of the principles recognized by the public service company law."

According to the concurring opinion of Commissioner McClure, an indirect approval of the 1907 contract and the provisions for the revision of fares would evidence "assent to all the rentals and other obligations of the transit company to its underlying companies, amounting to $7,365,900 per annum, being used in the making of a rate base regardless of the real value of their properties used and useful in the transportation of passengers." But, in his opinion, nothing in the contract would prevent the commission upon complaint from fixing a reasonable rate based upon fair value. Commissioner Rilling in concurring raised the same issue.

Power for St. Paul Electrification

More than 15,000 hp. is to be delivered the latter part of this year by the Washington Water Power Company, Spokane, for the electrification of the Chicago, Milwaukee & St. Paul Railway from Avery, Idaho, to the Columbia River. The contract for the power was made some time ago with the Intermountain Power Company. The electrification has been delayed, for under the contract 10,000 hp. was to have been utilized by this time. At the Long Lake plant an additional unit of 16,500 hp. is in process of installation, to meet the requirements of the Milwaukee contract. Indicative of the growth of the electric railroad business, there is a showing that for the calendar year 1916 the company produced 163,000,000 kw.-hr.; in 1917, 188,000,000 kw.-hr.; and for the twelve months ending Nov. 30, 1918, 194,500,000 kw.-hr.

Why the Milwaukee Men Struck

The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has publicly disclaimed that it is trying to dictate the form of revenue increase to be granted the Milwaukee car lines by the Railroad Commission of Wisconsin. The company says that it merely asks the commission to decide the matter in time to prevent a threatened strike of trainmen on Feb. 1. With respect to the recent short strike the company says:

> That strike was ordered by majority vote of the transportation department members of the Employees' Mutual Benefit Association. Their vote was taken by the Australian secret ballot system. The majority of votes cast for a strike was large.
>
> The company knew the men were entitled to the wage increase they demanded, and said so frankly. It also told the men it was unable to pay the increase, without robbing its stockholders of all wage on their investment, unless increased car earnings could be obtained.
>
> The Employees' Mutual Benefit Association, through its own independent audit of the company's books, was satisfied that what the company said was true. Nevertheless, the men struck. The company will be unable to prevent them from striking again on Feb. 1, if their January wage increase is not continued. Contrary statements are incorrect. Upon this point, as upon every other detail of the company's affairs, it welcomes the most searching investigation by any impartial organization or committee representing the public.

All the electric company's employees, except the executive officers, are hired by the employment office of the Employees' Mutual Benefit Association, under its contract with the company. All such men, if permanently employed, must become members of the Employees' Mutual Benefit Association, just as in a "closed shop" of any kind all workers must be or become members of the unions which supply employees.

Intervention of a committee of the Milwaukee Association of Commerce was largely responsible for the settlement of the recent strike. That association obtained the views of the men, the company and the commission and on the evening of the first day of the strike induced the company to pay during the month of January the increased wages asked by the men. The business men's committee in return promised to use its best efforts to have the commission render a decision by Feb. 1.

The company says that to prevent a renewal of the strike on Feb. 1 the commission only has to decide whether or not the company can afford to pay the increased wages out of earnings. If the commission says the company cannot pay the increase out of its earnings, presumably fares will be increased.

The alternative is for the commission to rule that the company has sufficient revenue out of which to pay the men an additional $460,000 a year. In this event the company will continue to pay the wage increase. There will be no strike as the company, if the decision is unfavorable to it, will have the privilege of appealing to the courts on the grounds that its property is being confiscated.

Some Columbus Problems Remain Unsettled

Redemption slips issued to passengers of the Columbus Railway, Power & Light Company, Columbus, Ohio, while a straight 5-cent fare was charged, are giving the new board of directors and officers of the company considerable concern. The aggregate liability under these redemption promises is about $75,000. Passengers are filing the slips with the company and asking for their money under the promise which was made when the reorganization was effected recently. Representatives of the Federal War Labor Board, who visited the city recently to learn how the company is meeting the increased wage problem, insist that the redemption slips be held in abeyance until the back pay due employees is made good. An official order from the board touching upon this is expected soon.

Charles E. Kurtz, president of the company, has announced that the directors want to redeem the slips, but that the attitude of the War Labor Board will make delay necessary. He has asked the people to be patient and has explained that an attempt will be made to arrange to exchange the slips for tickets at the old rate of eight for a quarter with universal transfers.

A decision was reached recently to the effect that the stockholders at the annual meeting will not adopt blanket resolutions indorsing the acts of the directors. This would put the stockholders on record as not in sympathy with some of the recent moves of the management that resulted in public criticism of the company.

Attorneys for some of the stockholders are still gathering data to be presented in case of future hearings on the Slaymaker receivership case. This case was left open in order that certain features of the management by the Clark Management Company may be considered further, if necessary.

Boston Freight Terminal Destroyed

A tank containing more than 2,000,000 gal. of molasses collapsed at Boston, Mass., on Jan. 15, killing at least eleven persons, injuring many others and destroying most of the electric freight terminal owned by the Boston Elevated Railway on Commercial Street and operated under lease by the Bay State Street Railway and Boston & Worcester Street Railway.

The collapse of the tank sheared off one column and bent two others supporting the elevated railway structure passing the site of the disaster, causing the fall of two spans and forcing the immediate suspension of traffic on both north and south tracks of the rapid transit lines connecting the two principal railroad terminals of the city.

An elevated train had just passed when the disaster occurred. No employees of the railway companies lost their lives, but several of the Bay State force on the premises were injured. The Boston company lost two cars, and several other cars are being salvaged from the wreckage of molasses and building debris which covers the district.

The brick office building of the freight terminal escaped with little or no injury. It has not been decided whether the terminal will be restored, as it was established in large measure to facilitate the handling of molasses from the waterfront to the plant of the United States Industrial Alcohol Company, Cambridge, active in munitions work.

Fort Collins M. O. Plans Maturing

The city of Fort Collins, Col., with a population of 13,000, at an election held on Jan. 7, voted five to one on a $100,000 bond issue to purchase the local property of the Denver & Interurban Railroad, referred to in the Electric Railway Journal of Jan. 25, page 204. The railroad went into the hands of a receiver last spring. This system comprises 7.51 miles of operative line, about 5 miles of which are within the city.

The property, consisting of all the tracks, both in and out of the city, carhouses and considerable other equipment, is being purchased by the city for $75,000, on a junk valuation basis. The old cars, although in excellent shape, are considered heavy for the local conditions and will be sold. A portion of the line also is to be junked. The 300-kw. rotary converter, formerly used, will be sold and replaced by a 75-kw. motor generator. Four lightweight safety cars will be operated in place of the old heavy ones.

An interesting feature in connection with financing the purchase is that the municipal purchase bonds bearing 5 per cent will be sold locally in denominations of $50 and $500. It is the intention of those in charge to give the bonds the widest possible local distribution in order to create a better spirit of co-operation among the citizens. Officers of the city were advised by bond dealers that the bonds, to be salable on the market at par, would have to bear 5½ per cent interest. One citizen has applied for one-half of the issue.

Expediting Seattle Purchase

The State Supreme Court of Washington has set Feb. 7 for the hearing on the appeal in the case to restrain the city of Seattle from completing the purchase of the railway property of the Puget Sound Traction, Light & Power Company. Corporation Counsel Walter F. Meier applied for an early hearing. In two actions brought in the King County Superior Court to prevent the completion of the railway purchase, the court decided in favor of the city, and the case was appealed. The consummation of the purchase is awaiting the disposition of the friendly court proceeding now in progress.

Twin City President Explains Predicament

Horace Lowry, president of the Twin City Rapid Transit Company, addressed a mass meeting at Lake Harriet on Jan. 13 on the railway problems before the company in Minneapolis and St. Paul. He outlined frankly the present predicament of the company, showing the inability to give satisfactory service in a constant effort to keep out of a receiver's hands, and the need for a cost-of-service franchise to insure its maintenance in the future. In this connection he said:

> The street car service to-day is admittedly far below what it has been. It cannot be improved under the present conditions. With the revenue to-day it is a problem to operate the lines on the present reduced service scale. Last year we operated on a basis of 2,800,000 car-hours, meaning actual time that cars were in operation. The year before the total was 3,500,000 hours.

Mr. Lowry said that he could not suggest a satisfactory fare increase, one which would mean sufficient revenus to operate the lines efficiently. This was due, he said, to uncertainty as to the actual amount of revenue increases to 6, 7 or 8 cents would bring.

Should the new franchise be adopted in which the company would turn over all surplus over and above a reasonable return on the money invested and the cost of depreciation, Mr. Lowry suggested that 75 per cent should go to the city and the remaining 25 per cent go to the corporation. The surplus could be used to allow ultimate fare reductions, he declared, and to build extensions. In conclusion Mr. Lowry said:

> We have no secrets. Our books are always open. Our one big purpose is to serve the people. Our second purpose is to give the men who have money invested in a company a reasonable return on their investment.

San Francisco Encroachment Case Before Supreme Court

United States Senator Hiram W. Johnson has been requested by the city of San Francisco, Cal., to represent it as its advocate when the suit of the United Railroads against the San Francisco Municipal Railway for paralleling its tracks on Market Street is heard before the United States Supreme Court in Washington in February.

Mayor Rolph of San Francisco was recently quoted as follows:

> Senator Johnson is not only one of the nation's foremost champions of municipal ownership, but is a man who always has the interests of San Francisco at heart. He has been a loyal friend of the Municipal Railway here. Personally I believe the city will have just cause for congratulation if it succeeds in getting him to be its spokesman in this suit.

The suit pending before the United States Supreme Court promises to be a major legal combat. While not a part of the suit, damages asked against the city by the United Railroads for $6,870,130 are indirectly involved.

As noted in the Electric Railway Journal for Jan. 25, page 201, the Superior Court recently upheld the city's demurrer in this case, stating that any damage resulting to the value of the franchises of the United Railroads had arisen as a result of rightful competition by the city and that the loss did not constitute a cause of action.

Paris Employees Strike

Cable dispatches from Paris dated Jan. 25 announced that the strike on the transportation lines of that city had come to an end after the government had announced it would requisition transport facilities.

The employees of the subway and surface railway companies adopted a resolution declaring they had decided "to respond to the requisition," it being understood that negotiations will be opened immediately with the companies or the government, which has substituted itself for them. Work was resumed progressively.

The employees of the Metropolitan subway earlier in the day put forward these demands: Permanence of work, eight hours a day after demobilization, an increase in wages of 2 francs daily, an annual vacation of twenty-one days with pay, a minimum pension of 2000 francs a year after twenty years of service, back pay of 3 francs daily on account of the high cost of living from Oct. 15, 1917, to July 1, 1918.

St. Louis Mayor Defended

Mayor Henry W. Kiel of St. Louis, Mo., apparently has as many defenders as detractors of his action in settling tax matters with the United Railways, to which reference has been made before in the ELECTRIC RAILWAY JOURNAL. The opposition was quick and loud in voicing its protest, but the element that is accustomed to withholding its opinion until it has inquired carefully into the merits of such controversies as come before it is making its strength felt. A resolution of confidence in the Mayor adopted by representative business men follows:

> We, the undersigned, interested in St. Louis and its prosperity, and in its good name for fair and honest dealing with its citizens who invest in its public service corporations, beg to assure you that we most heartily approve of, and thank you for, the recent agreement made with the United Railways and the spirit which actuated you in making it.
>
> You have been watchful of the city's interest, with no desire to play the demagogue or the destroyer of other people's property, and you have made a good, fair, honest settlement with the railways.
>
> We feel you are entitled to and will receive the approbation of the people of St. Louis. As taxpayers in St. Louis, we are thoroughly content to leave our interests in your hands.

For the convenience of the committees representing the Board of Aldermen and the Chamber of Commerce, President Richard McCulloch and General Counsel T. E. Francis of the United Railways, have issued a statement of facts in regard to settlement of litigation between the company and the city. This statement discusses the mill tax litigation, franchise agreements and sets forth the reasons for and terms of the recent settlement between the company and the city.

News Notes

Increase in Wages in San Juan.—The board of arbitration has awarded motormen and conductors of the Porto Rico Railways, Ltd., San Juan, P. R., an increases in wages of about 40 per cent, in settling the strike which began on Thanksgiving's Day.

Minor Changes in Oakland Grant.—The matter of a resettlement franchise for the San Francisco-Oakland Terminal Railways, Oakland, Cal., which has been referred to previously from time to time in the ELECTRIC RAILWAY JOURNAL, has not yet reached a final conclusion. During the last month or six weeks the franchise has been in the hands of a committee consisting of officials of the city of Oakland. This board is understood to have made a few minor changes in the grant.

Knoxville Wages Increased.—Trainmen in the employ of the Knoxville Railway & Light Company, Knoxville, Tenn., have been granted wage increases by a decision of the War Labor Board. The new wage scale is: 36 cents for the first six months; 38 cents for next three months and 40 cents for the time thereafter. The new scale will be retroactive from Aug. 3, 1918. The old wage scale allowed conductors 22 to 29 cents an hour according to the length of service with an additional 2 cents an hour bonus, when the employees worked continuously for twenty-eight days in the month.

Arbitration in Washington. — All questions in dispute between the Washington Railway & Electric Company, Washington, D. C., and 700 of its union employees, including recognition of the union, will be submitted to the National War Labor Board for arbitration and settlement. In accordance with the terms of a resolution adopted by the directors of the company, W. F. Ham, president, was willing to proceed at once to the discussion of any of the questions raised in the contract, but the committee of the employees stated it was only empowered by the union to sign the contract, which had been adopted at the recent mass meeting of the company's union employees.

Governor in Role of Accelerator.—A conference between Governor Smith of New York and the members of the Board of Estimate of New York City was held in Mayor Hylan's office on Jan. 25 at which the letter of the Public Service Commission to the Governor, complaining of the board's refusal to grant appropriations for rapid transit work, was thoroughly discussed. Apparently the results of the meeting were not highly satisfactory. The Governor, when asked about it, said: "There are two sides to the question. I can't make any decision. The only thing I can do is to urge both sides to stop quarrelling and get together; and vote the necessary appropriation to finish the subway."

Brooklyn Venue Change Allowed.—The five officials and the motorman of the Brooklyn (N. Y.) Rapid Transit Company who were indicted for manslaughter as a result of the wreck in the Malbone Street tunnel of the road in Brooklyn on Nov. 1 last, when almost 100 persons were killed, were granted a change of venue to Nassau County on Jan. 21 by Justice Stephen Callaghan of the Supreme Court in Brooklyn. The five officials and the motorman were to have been tried on the charge of manslaughter on Jan. 6 last, but the cases were postponed when they applied for a change of venue. Mineola, where the cases will be tried, is easy of access from Brooklyn over the Long Island Railroad.

Texas Going In for Regulation.—Senator Dorough has introduced a bill in the Texas Senate placing all public utility corporations, including electric railways, under control of the Railroad Commission of Texas. This bill is arousing strong opposition from Dallas, Fort Worth, Houston and other cities of the State that have exercised control over their local railways. It is maintained that State control would result in unified regulation that would destroy the efficiency of the individual systems. An amendment has been proposed that would not make the bill applicable in cities of more than 50,000 population, but this amendment does not satisfy the opponents of the measure, who want the act killed.

Bill to Protect Women Workers.—Assemblyman James H. Caulfield, Jr., of Brooklyn, at the request of the Women's Joint Legislative Conference, on Jan. 24, introduced a bill in the Legislature similar to the one which Senator Lockwood offered a few days ago regarding the hours of work of women on surface, elevated and subway cars. The measure limits the hours of women transportation workers to nine consecutive hours a day and provides for one day's rest in seven and no night work after 10 o'clock. Certain sanitary facilities are made compulsory. It also seeks to eliminate the "swings," and provides that the women should be paid from the time they report for work, whether or not they are immediately sent out on "swing."

Program of Meeting

Southwestern Electrical & Gas Association

Galveston, Tex., has been selected as the convention city for the Southwestern Electrical & Gas Association, according to announcement made by H. S. Cooper, Dallas, secretary of the association. The convention will be held between April 15 and June 10, the exact date to be chosen later.

Financial and Corporate

Receivership in Birmingham

Municipal Attacks Principal Factor in Destroying Credit of Railway, Light & Power Company

The Birmingham Railway, Light & Power Company, Birmingham, Ala., has gone into the hands of Lee C. Bradley as receiver. The appointment was made by Judge Grubb of the Federal Court in that city. This is the third property under control of the American Cities Company for which a receiver has been appointed within the last few weeks. The others are the New Orleans Railway & Light Company and the Memphis Street Railway.

PARENT COMPANY FILED PETITION

The appointment at Birmingham was made on the application of the American Cities Company. The receivership was asked in equity to safeguard the interests of the bondholders and creditors of the company. It is not a bankruptcy proceeding. The credit of the company has been destroyed largely through demands made upon the company from the local city administration. One of the previous creditors of the company on receipt of a recent order for goods notified the company that "due to existing local conditions the shipment would not be made unless cash was guaranteed."

Attached to the receivership application was the resolution of the City Commission of Birmingham in which it was outlined that the company must meet certain fixed requirements in the operation of the railway lines. The company considered these requirements to be unduly burdensome.

The total bonded indebtedness of the company is set out in the complaint to be $16,991,000, which includes $2,000,000 of short-term notes and $1,000,000 of bonds of the Tidewater Company.

The company has failed to pay any dividends on its common stock since 1914. In that year 6 per cent was paid. A 6 per cent dividend was paid on the preferred stock through 1914, but in 1915 only 3 per cent was paid. In 1916 and 1917, in addition to the regular 6 per cent on preferred stock, an additional dividend of 1 per cent was paid on account of arrears.

DETAILS OF ORGANIZATION

The Birmingham Railway, Light & Power Company was incorporated under the laws of Alabama on June 6, 1901, as a consolidation of the Birmingham Railway, Light & Power Company, the Birmingham Gas Company and the Consolidated Electric Company. About 86 per cent of the common stock and 80 per cent of the preferred stock is owned by the American Cities Company.

The Birmingham Tidewater Company, which is owned by the Birmingham Railway, Light & Power Company, was incorporated on Sept. 1, 1916, to take over the Birmingham Ensley & Bessemer Railway. The Tidewater Company was acquired by the Birmingham Railway, Light & Power Company on Feb. 26, 1917. The capital stock of the Tidewater Company is $325,000, with a property investment of $1,807,566, and a funded debt of $1,500,000.

Receiver for Providence

Company Operating All Rhode Island Lines Succumbs Under War-Time Conditions

Frank H. Swan, an attorney of Providence, R. I., on Jan. 30 was appointed temporary receiver of the Rhode Island Company, Providence. A hearing on the question of making the receivership permanent will be held on March 4. This action was taken by Justice Tanner in the Superior Court on petition of John J. Orr, Providence, a contractor, whose bill of complaint alleges that the company owes him $605; that it is unable to pay its bills, and is insolvent.

The affairs of the company have been before the public in one form or another for the last two or three years. War prices on labor and material have forced the company to seek aid wherever it could be found. A special commission of the last General Assembly found conditions desperate.

The Public Utilities Commission authorized a substantial increase in fares, but the extra revenue failed to cover increasing expenses. Among the largest of these expenses was an increase granted to employees by the War Labor Board. More recently, as noted on page 247 of this issue, the city and State authorities decided again to inquire into the affairs of the railway company with a view to recommending help for the company.

The inability of the company to pay rentals totaling $147,500 due to the United Traction & Electric Company on Dec. 24 resulted in the latter company making a demand for the payment of the same before Jan. 26. This matter was satisfactorily compromised, however, under an arrangement whereby the Rhode Island Company made a payment of $100,000 on Jan. 22 and was allowed an indefinite period of grace in which to pay the remaining $47,500. The sums represented payments on three leases.

Still more recently the general treasurer of the State of Rhode Island, as required by law, notified the Attorney-General of the failure of the company to pay its franchise tax approximating $125,000 and due on Oct. 1 last.

Under proceedings in the New Haven dissolution case, the railroad agreed to dispose of its electric railways. Federal trustees have since administered the Rhode Island property. The company operates 400 miles of line.

$22,500,000 Financing

New Jersey Corporation Outlines Plan for Meeting Maturing Obligations, Floating Debt and Capital Needs

The Public Service Corporation of New Jersey, Newark, N. J., has completed plans for comprehensive financing. It was necessary to procure $22,500,000 in order to put the corporation in a position to meet its collateral notes, amounting to $7,500,000 at par, maturing on March 1 next; to pay off all the other unfunded and floating indebtedness of the corporation, and to provide it with sufficient fund for its capital requirements for the current year. Subject to the approval of the shareholders of the corporation, at a meeting called to consider the plan, to be held on Feb. 10, the financing has been worked out in the following manner:

> The board of directors at its meeting on Jan. 28 authorized the creation of an issue of 8 per cent cumulative preferred stock to the authorized amount of $50,000,000, at par, that being the authorized amount of the existing capital of the corporation. The condition of the money market at the present time made it essential to make this stock an 8 per cent stock, in order that it might have proper selling quality, but it is provided that the corporation may, upon proper notice, redeem so much of this authorized issue of preferred stock as may from time to time be issued and outstanding at 110 per cent of its par value. This will serve to protect the corporation against the permanent existence of an 8 per cent preferred stock, should financial conditions return to a normal basis.
>
> When the necessary legal machinery shall have been complied with it is proposed to offer to the existing shareholders of the corporation $12,500,000 of gold collateral three-year 7 per cent notes of the corporation, to be secured by $14,000,000 at par of the general mortgage bonds of the corporation and $5,000,000 at par of the stock of the Public Service Electric Company belonging to the corporation. These notes are to be offered to the shareholders at 98½ per cent of their par value, and may be converted into the 8 per cent preferred stock of the corporation, at the option of the holders thereof, any time prior to Dec. 1, 1921.

A syndicate has been formed by Messrs. Drexel & Company, Philadelphia, and Bonbright & Company, Inc., New York, which has agreed to take such of these notes as may not be taken by the shareholders. It is simultaneously proposed to offer to the existing shareholders the right to subscribe pro rata to $10,000,000 at par of the new preferred stock.

The corporation will thus be entirely free from unfunded debt, except as to the new collateral gold note issue above referred to. It is expected that during the life of the notes either all or the major portion of them will be converted by the holders into the new preferred stock. If all are converted the corporation will be entirely free from unfunded debt, with a large amount of free and available assets in its treasury.

$3,000,000 Loan Approved

Brooklyn Receiver Authorized by Court to Arrange for This Sum for Immediate Use

Federal Judge Julius M. Mayer on Jan. 27 authorized Lindley M. Garrison, receiver of the Brooklyn Rapid Transit Company, to borrow $3,000,000 for immediate use with such resources as he has. Judge Mayer said that he would appoint E. Henry Lacombe, retired judge of the United States District Court, as special master to determine conditions affecting the issue.

The chief assets upon which the loan by the receiver can be based is $5,000,000 in 4 per cent refunding first mortgage bonds of the Brooklyn Rapid Transit Company in its treasury. The receiver expressed confidence in his ability to meet obligations as they develop.

Interest amounting to $539,000 on first mortgage bonds of the Brooklyn Union Elevated Railroad and the Kings County Elevated Railroad, subsidiaries of Brooklyn Rapid Transit Company, will be due on Feb. 1. A default on this interest might lead to a foreclosure suit that would jeopardize the dual subway contract.

Interest on paper in banks amounting to $40,000 is past due. The Brooklyn Rapid Transit Company has outstanding bank loans amounting to $3,800,000. Other interest payments will become due soon. A number of lawyers representing banks and Mr. Bogue of the War Trade Board, which holds $17,000,000 in notes, spoke in behalf of these claims.

The receiver said that it was his intention to pay interest on loans, but he would not renew the loans in a form that would make them obligations against the receivership. The lawyers assented to this and were in agreement that their clients would not press the receiver to put up additional collateral.

Some concern was expressed about the effect on existing collateral if the 4 per cent Brooklyn Rapid Transit bonds in the receiver's possession are put on the market. The receiver said he would not take this course without giving notice to the creditors.

Epidemic Effects Earnings

Operating Ratio for October for Country Reaches 80 Per Cent, Establishing New Record

The effect of the influenza epidemic on the receipts of electric railways is plainly shown in the comparative figures for October, 1918 and 1917, made public by the information bureau of the American Electric Railway Association.

Not only was there a decrease of 45.43 per cent in the net earnings of the companies, but for the first time since the association began the publication of statistics an actual decrease in the operating revenues per mile of line was shown. For the United States this amounted to 6.74 per cent. At the same time operating expenses continued to mount, there being an increase of 13.16 per cent. The consequence was an operating ratio for the country of 80.12, which again establishes a high record, the highest preceding operating ratio being that for January, 1918, which was 73.60 per cent.

SOME HARDSHIPS SUFFERED

Thus in 1918 the railways, in addition to the adverse conditions brought about by the war, were subjected to the hardships entailed by the severe weather of January, February and March, which not only greatly increased operating costs but cut down travel as well; the large increases in wages caused by the decisions of the National War Labor Board and an epidemic, which as previously stated caused an immense falling off in the number of passengers carried.

The Southern District makes the worst showing. This was to be expected, however, in view of the virulence of the influenza in that section of the country. Here operating revenue decreased 23.19 per cent while net earnings showed a decrease of 64.55 per cent. The operating ratio rose to 81.04 per cent. For the Western District the decrease in operating revenue was 9.07 per cent, the decrease in net earnings 48.15 per cent, and the operating ratio 78.53 per cent. The Eastern District showed a 4.21 per cent decrease in operating revenue, a 42.35 per cent decrease in net earnings, and an operating ratio of 80.38 per cent.

NOT SO BAD IN SOUTH

If the Southern District had experienced the same increase in operating expenses as did the Eastern and Western Districts its net earnings statement would have been even worse than it was. In the two latter districts the increase in operating expenses was more than 14 per cent, while in the former it amounted to but 5.65 per cent. This may in part be accounted for by the fact that wage awards of the National War Labor Board have been effective in more instances in the East and West than in the South.

How much better showing the returns for November will indicate is problematical. It will be remembered that the influenza was active in both months and that while it was perhaps at its height in October the situation was by no means entirely cleared up in November.

UNUSUAL CLASSIFICATION FOLLOWED

The returns from the city and interurban electric railway companies, as shown in detail in the appended tables, have been classified according to the following geographical grouping: Eastern District—East of the Mississippi River and north of the Ohio River. Southern District—South of the Ohio River and East of the Mississippi River. Western District—West of the Mississippi River.

COMPARISON OF REVENUES AND EXPENSES OF ELECTRIC RAILWAYS FOR OCTOBER, 1918 AND 1917

Account	United States				Eastern District				Southern District				Western District			
		Per Mile of Line				Per Mile of Line				Per Mile of Line				Per Mile of Line		
	Amount, October 1918	1918	1917	% Increase Over 1917	Amount, October 1918	1918	1917	% Increase Over 1917	Amount, October 1918	1918	1917	% Increase Over 1917	Amount, October 1918	1918	1917	% Increase Over 1917
Operating revenues	$8,492,548	$1,771	$1,899	†6.74	$6,755,750	$1,978	$2,065	†4.21	$586,129	$1,176	$1,531	†23.19	$1,150,669	$1,304	$1,434	†9.07
Operating expenses	6,806,731	1,419	1,254	13.16	5,428,526	1,590	1,392	14.22	474,920	953	902	5.65	903,285	1,024	894	14.54
Net earnings	1,685,817	352	645	†45.43	1,327,224	388	673	†42.35	111,209	223	629	†64.55	247,384	280	540	†48.15
Operating ratio, per cent	1918, 80.12; 1917, 66.03				1918, 80.38; 1917, 67.41				1918, 81.04; 1917, 58.92				1918, 78.53; 1917, 62.34			
Av. No. miles represented	1918, 4,795; 1917, 4,722				1918, 3,415; 1917, 3,409				1918, 498; 1917, 448				1918, 882; 1917, 865			

COMPANIES REPORTING TAXES

Operating revenues	$4,870,077	$1,680	$1,738	†3.34	$3,734,552	$1,818	$1,843	†1.36	$9,648	$546	$591	†7.61	$1,125,877	$1,361	$1,497	†9.08
Operating expenses	4,042,564	1,394	1,230	13.33	3,154,863	1,536	1,359	13.02	9,392	531	482	10.17	878,309	1,061	921	15.20
Net earnings	827,513	286	508	†43.70	579,689	282	484	†41.74	256	15	109	†86.24	247,568	300	576	†47.92
Taxes	376,067	130	121	7.44	288,963	141	130	8.46	192	11	13	†15.38	86,912	105	100	5.00
Operating income	451,446	156	387	†59.69	290,726	141	354	†60.17	64	4	96	†95.83	160,656	195	476	†59.03
Operating ratio, per cent	1918, 82.98; 1917, 70.77				1918, 84.49; 1917, 73.74				1918, 97.25; 1917, 81.56				1918, 77.96; 1917, 61 52			
Av. No. miles represented	1918, 2,900; 1917, 2,878				1918, 2,055; 1917, 2,050				1918, 18; 1917, 18				1918, 827; 1917, 810			

†Indicates decrease.

Boston Doing Better

The net earnings of the Boston (Mass.) Elevated Railway for December were only about $150,000 less than "cost of service," which compares with a $500,000 loss in November and nearly $800,000 loss in October. December's proportion of dividends was $116,997, which of course means that nothing was earned toward dividends in the month. Charges, however, were very nearly covered, for the first month since the property has been operated by the public trustees.

The receipts and number of revenue paying passengers in the six full months of public operation are as follows:

	Fare	Fare Receipts	No. of Passengers
July	5-cents	$1,525,338	30,510,760
August	7-cents	1,913,261	27,360,870
September	7-cents	1,722,738	24,610,340
October	7-cents	1,688,494	24,121,340
November	7-cents	1,919,914	27,427,340
December	8-cents	2,234,532	27,931,650

The Boston *News Bureau* regards the improvement as progressive. That paper says:

> While the road may soon be able to write in black figures the results of operation under an 8-cent fare, there is no sound basis for the belief that an 8-cent fare will very quickly make up any material part of the $3,274,487 deficit accumulated in the six months to December, inclusive. Eventually, with materials and operating costs generally lower, 8 cents may yield a good surplus. But for the time being the State guarantee will be needed.

Sale Postponed

Charles J. Finger, Delaware, Ohio, receiver of the Columbus, Magnetic Springs & Northern Railway, reports that the proposed sale by him of the property of that railway was postponed from Jan. 15 to a date not yet fixed by the court.

Financial News Notes

Discontinuance Allowed.—The Railroad Commission of California has authorized the Los Angeles & San Diego Beach Railway, Los Angeles, Cal., to discontinue its railroad service, having been shown that receipts from operation are insufficient to pay operating expenses.

Bondholders Buy Road.—The right, title, interest and franchise of the Carbon Transit Company, Mauch Chunk, Pa., were sold on Jan. 20 on a second mortgage claim of $100,000. Believing the company to be hopelessly involved the second mortage creditors have been agitating for their money for some time and the court appointed William Dobbs and Grant S. Mushlitz, Mauch Chunk, as receivers. The property was bought in behalf of the receivers who represent the second mortgage bondholders, the purchase price was $5,000, subject to the first mortgage of $150,000 and a number of claims for taxes, wages and liens, aggregating $20,000.

Connecticut Line Threatens Abandonment.—The Shore Line Electric Railway, which operates from New London north through Norwich, Baltic and Willimantic to South Coventry, has threatened to discontinue that part of the line between Baltic, Willimantic and South Coventry unless the present General Assembly grants it some measure of relief. The company says that the part of the road referred to has been run at a loss for the past year, due to poor patronage, increased wages and taxes which it regards as excessive. The Chamber of Commerce of Willimantic, the population of which has remained practically stationary for more than a decade, has taken the matter up.

Deposit of New Orleans Bonds Asked.—The holders of New Orleans Railway & Light Company 4½ per cent general mortgage, gold and other bonds affected by the default and receivership are invited to deposit their bonds with coupons due on Jan. 1, 1919, with the New York Trust Company, Hibernia Bank & Trust Company, New Orleans, La.; Commercial Trust & Savings Bank or the Interstate Trust & Banking Company, New Orleans. Negotiable certificates of deposit will be issued for deposited bonds. Application will be made to list such certificates on the several stock exchanges where the bonds are now listed.

Philadelphia Company Financing.—Shareholders of the Philadelphia Company, Pittsburgh, Pa., are being asked in a circular to send their proxies to a committee in order to secure enough stock to authorize the carrying out of the company's financial plan, which calls for authorization of a mortgage upon the property to secure $30,000,000 of bonds which will be used as collateral for an issue of $15,000,000 of 6 per cent notes. It is proposed, however, to sell only $10,000,000 of these notes in the immediate future for refunding purposes. The special meeting of shareholders will be held on Feb. 3. The proxy committee consists of Charles Hayden, chairman, Benjamin Guinness, Everett B. Swezy and Eugene V. R. Thayer.

Electric Railway Monthly Earnings

BATON ROUGE (LA.) ELECTRIC COMPANY

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '18	$25,503	*$14,783	$10,720	$3,976	$6,744
1m., Nov., '17	20,518	*9,907	10,611	3,611	7,000
12m., Nov., '18	261,797	*140'916	120,881	46,069	74,812
12m., Nov., '17	230,584	*115,717	114,867	42'662	72,205

BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '18	$6,443	*$9,361	†$2,918	$1,425	†$4,343
1m., Nov., '17	8,511	*9,858	†1,347	1,285	†2,632
12m., Nov., '18	104,214	*118,105	†13,891	16,710	†30,601
12m., Nov., '17	124,194	*123,927	267	14,556	†14,289

CAPE BRETON ELECTRIC COMPANY, LTD., SYDNEY, N. S.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '18	$49,233	*$37,073	$12,160	$6,528	$5,632
1m., Nov., '17	42,612	*28,256	14,356	6,468	7,888
12m., Nov., '18	507,951	*382,584	125,367	78,409	46,958
12m., Nov., '17	458,245	*293,237	165,008	78,668	86,340

COLUMBUS (GA.) ELECTRIC COMPANY

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '18	$106,270	*$53,792	$52,478	$34,661	$17,817
1m., Nov., '17	106,369	*37,508	68,861	31,729	37,132
12m., Nov., '18	1,182,908	*555,375	627,533	394,047	233,486
12m., Nov., '17	1,076,629	*408,472	668,157	555,848	112,309

EASTERN TEXAS ELECTRIC COMPANY, BEAUMONT, TEX.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Oct., '18	$87,857	*$64,791	$23,066	$14,934	‡$8,436
1m., Oct., '17	76,333	*45,043	31,290	12,242	‡21,678
12m., Oct., '18	1,086,207	*617,542	468,665	139,567	‡322,158
12m., Oct., '17	925,937	*511,642	414,295	131,931	‡296,284

EL PASO (TEX.) ELECTRIC COMPANY

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '18	$106,565	*$73,287	$33,278	$6,820	$26,458
1m., Nov., '17	108,203	*68,004	40,199	6,503	33,696
12m., Nov., '18	1,243,795	*859,022	384,773	80,637	304,136
12m., Nov., '17	1,292,396	*789,758	502,638	65,835	436,803

GALVESTON-HOUSTON ELECTRIC COMPANY, GALVESTON, TEX.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '18	$241,487	*$177,525	$63,962	$39,431	$24,531
1m., Nov., '17	196,272	*122,876	73,396	38,328	35,068
12m., Nov., '18	2,644,639	*1,795,750	848,889	471,119	377,770
12m., Nov., '17	2,055,027	*1,365,078	689,949	449,166	240,783

HOUGHTON COUNTY TRACTION COMPANY, HOUGHTON, MICH.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '18	$22,838	*$15,411	$7,427	5,078	$2,349
1m., Nov., '17	25,987	*16,986	9,001	5,075	3,926
12m., Nov., '18	322,007	*217,881	104,126	60,285	43,841
12m., Nov., '17	341,718	*211,220	130,498	61,465	69,033

JACKSONVILLE (FLA.) TRACTION COMPANY

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '18	$90,341	*$70,176	$20,165	$16,970	$3,195
1m., Nov., '17	60,939	*42,368	18,571	15,848	2,723
12m., Nov., '18	916,697	*677,588	239,109	197,881	41,228
12m., Nov., '17	690,833	*462,942	227,891	188,581	39,310

NORTHERN TEXAS ELECTRIC COMPANY, FORT WORTH, TEX.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '18	$216,149	*$153,788	$62,361	$27,967	‡$43,976
1m., Nov., '17	270,510	*144,286	126,224	28,239	‡107,548
12m., Nov., '18	2,974,455	*1,864,541	1,109,914	339,434	‡883,439
12m., Nov., '17	2,470,263	*1,399,013	1,071,250	348,390	‡742,025

PENSACOLA (FLA.) ELECTRIC COMPANY

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '18	$48,813	*$37,416	$11,397	$8,543	$2,854
1m., Nov., '17	32,129	*18,647	13,482	7,825	5,657
12m., Nov., '18	490,376	*359,145	131,231	98,458	32,773
12m., Nov., '17	342,220	*198,055	144,165	93,503	50,662

TAMPA (FLA.) ELECTRIC COMPANY

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '18	$90,807	*$55,158	$35,649	$5,031	$30,618
1m., Nov., '17	78,087	*45,173	32,914	5,314	27,600
12m., Nov., '18	1,046,833	*613,757	433,076	61,226	371,850
12m., Nov., '17	1,004,802	*559,024	445,778	55,401	390,377

* Includes taxes. † Deficit. ‡ Includes non-operating income.

Traffic and Transportation

Patrons Organize Relief

Plan to Do What Commission Recommended But Can't Do and City Has Failed to Do

Prospects seem to be bright for the New York & North Shore Traction Company, Roslyn, N. Y., obtaining through the concerted and voluntary action of its patrons the measure of relief from war-time burdens which has been withheld from it by the officials of the city of New York.

RESIDENTS TO THE RESCUE

Residents of the territory through which the company operates have taken up the matter by enlisting in a campaign to induce the riders voluntarily to pay the company a 7-cent fare. The movement appears to be becoming cumulative in its effect. Conductors reported on Jan. 28 that for the three days ended Jan. 27 they had received on an average 250 7-cent fares a day.

Those behind the movement have had placards printed calling attention to the needs of the company and have had these posted in the cars and at conspicuous places along the route to acquaint strangers with the facts and gain adherents to the cause. In the localities served by the company petitions have been prepared requesting the authorities to authorize the company to collect a 7-cent fare. When these petitions have been filled with signatures they will be presented to the Board of Estimate.

The effort of the company to obtain additional revenue through a fare increase was started early in 1917 in an action before the Public Service Commission. Decision was rendered in January, 1918. The commission held that, due to the agreement of the company with the city, it was powerless to act in the matter. This view of the commission with respect to its authority over fares was later sustained in the so-called Rochester case.

CITY OFFICIALS LISTEN ATTENTIVELY

The agitation in favor of an increase in fare was continued and carried direct to the city officials of New York. In consequence, Mayor Hylan, Comptroller Craig and Borough President Connelly of Queens discussed the case of the company in June before a crowd that packed the courtroom in Flushing.

The declared purpose of this meeting was to hear whether the public desired to pay 7 cents or preferred to have the line abandoned. At the close of this meeting the question was put to a vote. The decision was overwhelmingly in favor of the fare increase. Mr. Connelly explained at this meeting that the application of the company was before the Board of Estimate because the Court of Appeals in the Rochester case had ruled that the Public Service Commission was limited in its rate-making powers by the terms of the municipal franchise contracts and that an increase could be obtained only by a modification of the franchise by the Board of Estimate. Despite their knowledge of the situation confronting the company and their acquaintance with the attitude of the public members of the local administration in New York have taken no action on the matter.

COMPANY THREATENS TO SUSPEND

In September, the company declared that operation would cease unless the city granted financial relief or positively signified its intention to do so at an early date. This threat was renewed by the company recently and patrons of the railway, convinced that the company was entitled to an increase and fearing that service would be suspended, organized to do voluntarily what the Public Service Commission was powerless to do and what the city officials of New York had failed to do through inaction.

New Paper in Buffalo

The first issue of *The Service Spot Light*, published by the newly organized publicity department of the International Railway, Buffalo, N. Y., was issued on Jan. 20. The publication is an eight-page pamphlet issued every Monday. The motto of the publication, printed on the first page is "A White Light on Open Dealings." A feature of the publication is "The Transformer" page, which contains poems and witty paragraphs.

The Service Spot Light is placed in the "Take One" boxes in the cars and in the stations along the company's interurban lines. The object of the pamphlet is to present to the traveling public the company's side of traction problems.

"Our Hero Gallery" is another feature of the publication. Pictures will be reproduced from week to week of the company's men in the military service. The interurban and owl schedules are published together with a page devoted to "What's Doing in Buffalo." The public is invited to send the editor of the publication the numbers of conductors and motormen whose acts of courtesy should receive publicity. The company's lost and found department is featured and space is given to the advantages of the International's interurban express trains and service. The editor is a prominent Buffalo newspaperman.

Los Angeles Running Behind

Commission on Feb. 4 Will Start Inquiry of Relief for Los Angeles Railway Corporation

The Railroad Commission of California has set Feb. 4 as the date for the beginning of its investigation into the affairs of the Los Angeles Railway Corporation. The inquiry was asked by the company in an effort to devise ways and means for meeting its financial troubles and its traffic troubles. The preliminary hearing will be held at the Los Angeles office of the Railroad Commission, and the merits of the case will be gone into by E. O. Edgerton, president of the commission, and Commissioners Brundige and Martin.

Last December the company, after vainly striving to find a means to meet its financial obligations and preserve its standard of service without asking for help in the shape of increased fares, determined to call in the aid of the Railroad Commission. In its petition to the commission it set forth that it had already taken the matter up with the city authorities of Los Angeles and the board had recommended certain service changes that would result in more economical operation. The company says further:

> The company has other suggestions and recommendations to make in the way of retrenchment and desires the benefit of such advice and recommendations as the commission may make after careful study and investigation.

The Los Angeles corporation declares that for some time past it has been sustaining a heavy financial loss because of the increase in wages and in cost of materials. During the last two years, the company says, wages have been increased at least 45 per cent, and the cost of materials from at least 50 to 150 per cent, the increase in wages alone amounting to $1,200,000 a year.

TEN MONTHS' DEFICIT $336,400

According to exhibits filed by the corporation, its gross income for the past ten months has been $5,548,431 and the gross expenses, including operation, depreciation, taxes and interest, $5,744,610, showing $196,178 expenditures in excess of revenue. This does not include $170,221 sinking fund. With this fund added, the total deficit for the last ten months will reach $336,400.

Pittsburgh Service Order Suspended

The Public Service Commission of Pennsylvania has suspended until Feb. 8 the order of Dec. 10 requiring all cars of the Pittsburgh Railways, except summer cars, to be put in condition for use. In the meantime a study of conditions is to be made and the order will be repealed if a decided improvement is shown in the service. Under the original order the company would have to make repairs to nearly 200 cars, which it is claimed are unsuited for operation. The order as now in force requires 1302 cars to be put in use.

International Railway, Buffalo, Prepared

Following Investigation Commission Finds City Lines Fully Equipped for Service Demands

A report of an investigation of traffic conditions in Buffalo has been sent by Chairman Hill of the Public Service Commission for the Second District of New York to Mayor Buck and the International Railway. The commission says the general facilities for rendering railway service in Buffalo have been very substantially improved, and that systematic checks which have been made of the present service indicate that the service is reasonably satisfactory.

COMMISSION POINTS OUT DEFECTS

The commission in a report made to the company on May 22, 1917, pointed out defective facilities and made certain recommendations. Full compliance was delayed for various causes and the improvements contemplated were not effected during the winter of 1917-18. This was one of the causes of the unsatisfactory service last winter, which was aggravated by unusually severe weather conditions.

The report now forwarded to Mayor Buck and the railway by Chairman Hill makes further recommendations to insure good service in Buffalo this winter.

The commission found that one of the important causes of the poor service last winter was insufficient number of cars, principally owing to the large number out of service, damaged and crippled, also the practical breakdown of the mechanical equipment. On Feb. 21, 1918, there were 276 or 42.3 per cent of the cars out of service, damaged or crippled. Inadequate and unsatisfactory service followed, especially during rush hours. The company lost forty-five cars by fire in April and two were retired. The company since that time has received 130 new cars of which 127 have been assigned to the Buffalo service, so that at present there are assigned to the city service 732 cars, a net increase at present, compared with last year, of eighty cars. On Nov. 5 there were 111 cars out of service or 15.2 per cent of the assigned equipment.

SHOP FACILITIES INCREASED

Increased shop facilities and improved methods justify the estimate of the company that 660 cars are available for service in Buffalo. The winter's schedule requires 620 cars, and allowing 10 per cent for cripples and overhaul there will be 659 cars available to meet the city's requirements, or thirty-nine more cars than required.

As far as the number of cars is concerned, the report states that the company seems to be reasonably equipped for the present winter's operations. This improved condition is due in a great measure to the improvements in shops, carhouses and mechanical equipment brought about by compliance with the recommendations of the commission, including rearrangements and additions of facilities in the Cold Springs shop, appliances added in the carhouses, complete reorganization of the mechanical department and an improvement in standard of car maintenance.

Shortage of cars prevented lack of seating capacity last winter during rush hours. To improve this condition the report says:

> The company is making schedules on a basis that, during each fifteen minutes interval of the rush hours, the number of passengers carried past a given point shall not exceed the seating capacity furnished by more than 50 per cent. While the commission does not believe it advisable at this time to establish a precedent by aproval of this basis, yet in some other cities the basis of 50 per cent of standing passengers is exceeded and it is believed that if cars required by a schedule on this basis are run on schedule regularity that the people of Buffalo will receive a materially improved service over that furnished last winter, and one which can be properly classified as reasonable.

The report decides not to recommend a resumption of discontinued night service at the present time. The company is to be allowed further trial of the present night service schedules.

Following the commission's recommendations, 348 cars have been equipped with the modern system of forced draft hot air heating and ventilation and 127 new cars are likewise equipped. The work of equipping the remaining 262 cars has been delayed by reason of the company's inability to secure materials, even if its financial condition would permit. Defects in lighting have been remedied.

The railway has added five modern sweepers and the snow fighting equipment has been overhauled and necessary repairs made. This equipment is considered sufficient and in proper shape, if efficiently utilized, to keep the tracks in condition for service run on schedule regularity except perhaps in extreme and unusually severe storms, and in such cases the duration of interference with operation should be limited.

The commission says that the company is properly equipped with power for this winter's operations.

Houston Must Have More

Review of Fare Relief Case Which Had Its Beginning Last June—City Commission Decision Recalled

The Houston (Tex.) Electric Company is facing financial collapse, according to David Daly, general manager, in an appeal to the public for support of the company's efforts to secure a 6-cent fare. Mr. Daly said:

> The problems facing this company and the disaster which it is struggling to avert are bad enough, viewed only from the standpoint of the company, but it is not alone the company that is involved, for the breaking down of the transportation system would mean a blow to the development of Houston. Our problem is at once the problem of every citizen and taxpayer in Houston.
>
> The Houston Electric Company has long since reached the point where it costs more than 5 cents to furnish a ride. If the company is to live and furnish service to the people of Houston, it must have an increase in fares. That it can continue indefinitely to do business at a loss is obviously impossible.
>
> In an election held in November we were denied an increase in fares. The point was made against us that the public had not been furnished sufficient information as to the value of our property. In order to meet this criticism and as a part of the plan to get this increased fare, which the company must have, we have arranged to have a valuation of our property made at once.

The valuation just referred to will be made by Halford Erickson, Chicago; Robert M. Feustel, Madison, Wis., and Mr. Powers, New York.

Prior to this action, the Houston Electric Company has tried by every means to secure an increased fare, but without avail. Last September, following an exhaustive investigation of the company's properties and operating income, the City Commission of Houston enacted a city ordinance authorizing the company to charge a fare of 6 cents with half-fare tickets for children and students. Upon petition of the required number of taxpayers, the City Commission then suspended this ordinance and submitted it to the people for ratification under the referendum provision of the city charter. At this election, held on Nov. 5, last, the ordinance was defeated. Members of the City Commission considered the results of this election as instructions on the fare question and the ordinance was repealed, and another enacted fixing the fare at 5 cents.

CASE CARRIED TO COURT

The next move made by the traction company was the filing of a suit in the Sixty-first District Court asking for an injunction to restrain the city from enforcing the 5-cent fare ordinance. The company in its petition to the court, which was referred to in the ELECTRIC RAILWAY JOURNAL of Jan. 25, page 208, asked that the city be enjoined from interfering with the company in collecting the 6-cent fare provided in the ordinance passed on Sept. 19 and preventing it from delegating its rate-making powers to any other authority. The company contended that rate-making is a legislative function, which under the charter granted the city of Houston by the Legislature in 1905 was specifically delegated to the governing body of the city of Houston, which in fact is the Mayor and City Commission. It was further contended that the city is without authority to re-delegate this power and that therefore the action of the commission in submitting to the people for ratification the 6-cent fare ordinance was null and void and that this ordinance is still in effect.

The pleading, with numerous exhibits attached, recites a history of the company's negotiations with the city for an increase in fares beginning in June, 1918. It is shown that while the petition for an increase in fare was pending the War Labor Board made a ruling requiring still further increase in wages amounting to approximately $100,000 a year, and that the company amended its original petition by asking for a 7-cent fare in order to enable it to grant this further increase in wages to employees. Acting in good faith in accord with the city ordinance of Sept. 19, the company granted increased wages to its employees, which it was wholly unable to do and earn a fair and just return upon its investment.

Final hearing on the company's petition will be postponed pending a report from the board of engineers appointed to make valuation of the company's properties.

Receiver Wants Citizens to Help

James E. West, Chief Scout Executive of the Boy Scouts of America, has written to Lindley M. Garrison, receiver of the Brooklyn (N. Y.) Rapid Transit Company, suggesting that the receiver "organize a small citizens' committee among those who use each of the various divisions of the lines in receivership, to serve without compensation as advisers to you with reference to improvement in service."

Mr. West said that he was convinced "that men and women of ability would gladly enter into the spirit of such a scheme and render you valuable service, not primarily to increase the dividends of the Brooklyn Rapid Transit Company, but to give the public better service, and this course would mean increased dividends in the long run. Certainly it would serve as a clearing house for the consideration of the merits of various complaints and suggestions which will be made to you."

Mr. Garrison wrote to Mr. West immediately accepting the suggestion, but in somewhat different form from that in which it was made. In his letter Mr. Garrison said:

> I do not think it would be desirable for me to organize the citizens' committee of which you speak, but I would be very glad if such a committee should be organized. I am extremely desirous of rendering the very best service with the facilities under my control, and I recognize the benefit of sensible and well-meaning advice from every source, and I have no doubt that such a committee as you speak of would be of great use to me in the proper execution of my duties. May I venture to suggest that you set about organizing a committee for that purpose, and I assure you that I will work in the fullest co-operation with you and with such committee.

Six Cents in Springfield

The Public Service Commission of Missouri on Jan. 22 advised the Springfield Traction Company that it had granted the company's application for an increase of passenger fares from 5 cents to 6 cents, effective on Feb. 1.

The additional fare was recommended some time ago by a citizens' committee headed by Judge John T. Sturgis, presiding judge of the Springfield Court of Appeals. It was approved by the City Commissioners.

The increase in the fare followed a demand on the part of the railway employees for increased pay as motormen and conductors. A few weeks prior to this demand an increase of 20 per cent had been granted, but the men held that this increase was not in keeping with war-time cost of living. A change in the working hours was also sought in order that the men would work only nine hours a day.

Effective at the same time the increased fare is authorized, the men will receive an increase of wages amounting to about 43 per cent. The total increase will increase the payroll of the company from $95,000 to about $175,000 a year. The men will now receive 36 cents to 40 cents an hour. The installation of pay-as-you-enter cars will enable the company to operate the street cars with practically the same force it now has. One man will be assigned to each car.

There is no change in the transfer system. Children's fares will be 3 cents. The new fare will be effective for a period of six months.

The matter has been carried to a satisfactory settlement through the cordial co-operation of the citizens as reflected in the attitude of the committee appointed from among them. This committee's activities were referred to in the ELECTRIC RAILWAY JOURNAL for Nov. 30, page 988.

Transportation News Notes

Board of Trade Convinced.—The Louisville (Ky.) Board of Trade is said to favor a 6-cent fare after investigating the condition of the Louisville Railway as shown by its earnings and operating costs for 1918.

Proposed Increase Suspended.—The application of the East St. Louis (Ill.) Railway to increase rates in East St. Louis has been suspended until July 20, 1919, by the Public Service Commission of Illinois. The company is now charging 6 cents.

Skip Stops Go in St. Louis.—The skip-stop system of operation put into effect by the United Railways, St. Louis, Mo., on Sept. 22, 1918, as a fuel conservation measure, has been ordered eliminated by the Public Service Commission of Missouri. The order also affects St. Joseph and Springfield.

Rhode Island Hearing Again Postponed.—The Supreme Court of Rhode Island has postponed from Jan. 27 to Feb. 14 the hearing before it on the appeal of the towns of Warwick, North Providence, East Providence, Johnstown and the city of Cranston from the decision of the Public Utilities Commission in granting the Rhode Island Company permission to increase fares.

Organizing Its Own Express System.—The Illinois Traction System, Peoria, Ill., is perfecting plans to organize an express company to operate over the 400 miles of its lines. The tariff schedules are being prepared for filing with the Public Service Commission of Illinois. No express shipments have been handled over the Illinois Traction System since the American Railway Express contract expired.

Schenectady Tariff Further Suspended.—The Public Service Commission for the Second District of New York has passed an order further suspending to and including Feb. 28 operation of the new schedule of passenger rates on all divisions of the Schenectady Railway, the investigation of the reasonableness of the increased fares not having been concluded by the commission. The suspension order previously in force expired on Jan. 30.

Objects to Service Order.—The St. Paul (Minn.) City Railway, included in the system of the Twin City Rapid Transit Company, went into Federal Court on Jan. 23 and procured an order from Judge Wilbur F. Booth, restraining the city from invoking mandamus proceedings to force the railway to comply with the service ordinance adopted by the City Council on Jan. 28, 1918. The petition of the company asks for a temporary injunction against the city, pending a hearing on a permanent injunction.

Rochester-Syracuse Rates Restored.—The Rochester & Syracuse Railroad under special permission of the Public Service Commission for the Second District will restore joint one-way fares in effect prior to Nov. 24 from Clyde, East Rochester, Fairport, Jordan, Lyons, Macedon, Memphis, Newark, Palmyra, Port Byron, Port Gibson, Rochester, Savannah, Warner and Weedsport to Auburn, Baldwinsville, Fulton, Minetto, Oswego and Phoenix on the Empire State Railroad. Reductions are effected.

Freight Service Between Canton and Detroit.—Through freight service has been established by the Northern Ohio Traction & Light Company between Canton, Ohio, and Detroit, Mich. Beginning on Jan. 27 cars will be operated on Monday, Wednesday and Friday of each week until the volume of business warrants more frequent trips. The cars will start from each end of the line in the evening, thus making the greater part of the trips at night. Operation will be over the line of the Lake Shore Electric Railway.

Rate Appeal Matter Undecided.—At the annual meeting of the New Jersey League of Municipalities held at the Municipal Building, Trenton, N. J., on Jan. 22 the matter of appealing to the United States Supreme Court the right of the Board of Public Utilities Commissioners of New Jersey to abrogate municipal franchise contracts was thoroughly discussed. It was decided to refer the matter of appealing the Public Service Railway rate case to the

League's legal advisory committee. The committee will make a report on it later.

Fare Boxes in Washington.—On Jan. 26, cars of the Pennsylvania Avenue line of the Capital Traction Company, Washington, D. C., were equipped with coin-registering fare boxes. It is the purpose of the company to complete the equipment of all its cars with these boxes as soon as they can be obtained. The conductors have been instructed to give passengers, requiring it, the exact change for any amount up to $2. The Washington Railway & Electric Company also installed fare boxes and the prepayment method of collection on Jan. 26. Both companies advertised the change extensively in the daily papers.

Des Moines Fare Hearing Feb. 3.—Judge Martin J. Wade has notified city officials, the Des Moines (Iowa) City Railway, the Harris Trust & Savings Company, and the North American Construction Company that he will hear the petition of the Des Moines City Railway for an increased fare on Feb. 3. According to Judge Wade the hearing will be only on the construction of the terms of the franchise secured three years ago by the City Railway. The company is in the hands of a receiver. It carried its case to the court after failing to obtain some measure of relief from the city from burdens that had become to onerous for it to bear.

Special I. T. S. Commuter Rates.—The Illinois Traction System, Peoria, Ill., is contemplating a special tariff for the convenience of commuters who regularly use the lines between stated points. This tariff, which will probably be put in effect within the next thirty days, will affect the rate between points where the one-way fare is between 15 cents and 90 cents. It will provide for a 20-mile ride commuter's book at a discount of 10 per cent; a forty-ride book at a discount of 20 per cent; and a fifty-two-ride book which will reduce the fare to slightly below 2 cents per mile. The books will be limited to use of the purchaser within the calendar month in which issued.

Indiana Commission Denies Fare Advance.—The Public Service Commission of Indiana has denied the petition of the Hammond, Whiting & East Chicago Traction Company, Chicago, Ill., for an increase in fare from 5 cents to 7 cents. The company filed its petition last August. According to the commission the company is earning 9.03 per cent on $1,168,145, which sum the commission found to be the reproduction value of the property. The figure represents a valuation of approximately $30,000 a mile. The commission estimated that net revenue for 1919 would be $121,029. The commission engineers found the book value of the company to be $2,762,746.

Dayton Fare Concessions Unsatisfactory.—It is rumored that the railways of Dayton, Ohio, will reject the offer of the City Commission for a straight 5-cent fare. Officers say that the proposed means of relief will be of no benefit to them, particularly as there is nothing to prevent the wholesale purchase of tickets at the old rate, should the new ordinance be passed. The City Commission has, however, now amended the ordinance in such a way that tickets will be void when it goes into effect, but a bureau must be established to take over the tickets at cost. One section of the ordinance was rewritten to make it plain that the new grant is only a temporary measure. The companies have ten days within which to accept the ordinance.

A. E. & C. Wants Illinois Commission Restrained.—The Aurora, Elgin & Chicago Railroad, Wheaton, Ill., has brought suit to enjoin the Public Utilities Commission of Illinois from enforcing its maximum fare ruling of 2 cents a mile, pointing out that Judge Landis held that other electric lines operating in Illinois could charge 3 cents a mile. It is alleged that the Interstate Commerce Commission set the rate for electric roads during the war at 2.4 cents per mile, but that the Public Utilities Commission of Illinois continued the 2-cent fare on the Aurora, Elgin & Chicago Railroad and that the Supreme Court of Illinois upheld its power to do so. The present action is similar to others in Illinois to which reference has been made at length previously in the ELECTRIC RAILWAY JOURNAL.

Four-Cent-a-Mile Rate in Effect.—Increased passenger rates went into effect on Jan. 23 on the Southern New York Power & Railroad Corporation's road between Mohawk and Oneonta, under the recent decision of the Public Service Commission for the Second District. The order permitting the increase from 3 cents to 4 cents a mile is on the understanding that application to reopen the order may be made when reasons for the increase in fare no longer exist. The mileage book rate is to be increased from 3 cents, to 3½ cents a mile. New rates do not apply in Oneonta and between Oneonta and Junction and between Herkimer and Mohawk over the New York State Railways' tracks. The decision of the Commission in this case was reviewed in the ELECTRIC RAILWAY JOURNAL for Jan. 11, page 116.

Mr. Ross Retained in Birmingham.—I. W. Ross, vice-president and general manager of the Tuscaloosa Railway & Utilities Company, Tuscaloosa, Ala., has been retained by the City Commission of Birmingham, Ala., to report on the financial status and operating and physical condition of the Birmingham Railway, Light & Power Company. In a statement which he made Mr. Ross said that he had not been advised and did not know what use the city intended to make of the information he was gathering and that he was not interested in that feature of the matter. In this connection he is quoted as follows: "I am only temporarily in Birmingham for the purpose of collecting information and turning it over to the city authorities. This information will consist primarily of statistical data which I am obtaining with the co-operation of the Birmingham Railway, Light & Power Company."

Wants Interchangeable Transfers Abolished. — The receiver for the Buffalo & Lackawanna Traction Company, Buffalo, N. Y., has applied to the City Council of Buffalo for permission to abolish interchangeable transfers with the International Railway. It is pointed out that by abolishing these transfers, the company would be able to increase its revenue by almost $1,600 a month. The Council "received and filed" the company's request and has promised to make an investigation. The company operates from a terminal in the heart of the retail business section of the city to the city line of Lackawanna. It accepts transfers from the local lines of the International Railway and issues transfers to the International lines. The property is being run at a deficit and the receiver told the Council that unless the company is allowed to increase its income through higher fares or other means, he will be forced to apply to abandon the route.

Booklets Review New York Fare Appeals.—A recapitulation of the arguments used by the New York Railways and the Interborough Rapid Transit Company in support of their applications for increased fares and in opposition to municipal operation is contained in two booklets sent out and signed by Theodore P. Shonts, president of the companies. One is entitled, "Your Subways: A statement of the Facts About the Partnership Between the City and the Interborough Rapid Transit Company," and the other is called "Your Street Car Service: A Statement of the Facts About the Situation of the New York Railways Company." In the railways booklet the statement is made that the New York Railways is on the verge of a receivership; that the company is not overcapitalized; that it is economically operated and that it has never paid a dividend on its stock. With respect to the Interborough Rapid Transit Company the situation is presented briefly as follows: The city of New York is facing deficits amounting probably from $13,000,000 to $15,000,000 a year on the operation under 5-cent fare of the dual subway system. Owing to abnormal costs for labor, materials, and supplies, taxes, etc., due to conditions produced by the war, the system is not now earning the preferential payments to be made from operating revenue to the companies. These payments are cumulative, with interest compounded semi-annually. The question which the company asks is: Shall the situation be met by higher fares or additional taxation?

Personal Mention

W. C. Sparks Elected

Vice-President of Rockford & Interurban Railway Made President of the Illinois Electric Railway Association

W. C. Sparks, vice-president and general manager of the Rockford & Interurban Railway, Rockford, Ill., was elected president of the Illinois Electric Railway Association at the annual meeting held in Chicago on Jan. 17.

Mr. Sparks has been actively connected in the electric railway field for the last seventeen years, and has been identified with his present company for eight years. He was graduated from the civil engineering school of the University of Indiana in 1900, and immediately entered government service in the Philippines, where he remained for nearly two years. Upon returning from the Philippines he entered the engineering department of the Union Traction Company of Indiana, and was chief engineer of that company when he resigned in 1910 to become general manager of the Rockford & Interurban Railway Company. He was in addition made vice-president of this company in 1916.

While with the Union Traction Company of Indiana, Mr. Sparks was active in the Central Electric Railway Association, and since his present connection with the Rockford & Interurban Railway he has for many years been active on legislative and executive committees of the Illinois Association. The company of which Mr. Sparks is now vice-president and general manager operates more than 100 miles of interurban lines, doing an extensive passenger, freight and express business. It is a subsidiary of the Union Railway, Gas & Electric Company.

A Prophecy Becomes Fact

James F. Shaw, of Knauth, Nachod & Kuhne, New York, N. Y., investment bankers, and former president of the American Electric Railway Association, was interviewed by the *Wall Street Journal* in its issue of Jan. 13 on the traction situation in New York. Mr. Shaw says that the bottom has been scraped in that city. He then is quoted in part as follows:

> The worst that can happen has already happened. It is not conceivable that the city administration can or will in the long run deny to the companies an increase in rates. The city has too heavy an investment in the enterprise deliberately to wreck it and I am willing to predict that even if politics have to be adjourned, an increase in fares will be forthcoming in the not distant future.

Mr. Shaw referred to statements made by him as far back as 1910 about the inadequacy of the nickel fare to show more than a 3 or 4 per cent return on the cost to reproduce the property of the old Metropolitan Street Railway, now the New York Railways, not taking into consideration the expenditure for organization and obsolescence.

Mr. Royce Made Manager

New B. R. T. Official Who Replaces Colonel Williams Is a Practical Operating Official

Frederick P. Royce, a member of the Stone & Webster organization, Boston, has been appointed general manager for the receiver of the Brooklyn Rapid Transit Company. Mr. Royce will take up his new work by Jan. 31, will be in full charge under the receiver of all matters pertaining to operation and will take the place of Col. Timothy S. Williams, president of the company, who, at his own request, will be relieved of all responsibility for the administration of the system. The new manager will have the same relation toward Mr. Garrison, the receiver, as the chief of staff when Mr. Garrison was Secretary of War. His duties will be to investigate different matters and do everything possible to bring about a better condition of affairs in the operation of the various lines.

F. P. ROYCE

Mr. Royce has had a wide experience with his firm in all branches of administration, including construction work, investigation and analysis of public utility situations, the preparation and carrying out of financial plans, the direction of local operating managers and the maintaining of satisfactory relations with the public served. He is in a position to bring to bear on the problems of the Brooklyn Rapid Transit Company the varied knowledge the Stone & Webster organization has acquired through its many years of city railway management.

Mr. Royce was born in Newton, Mass., on Oct. 5, 1858. He attended the Massachusetts Institute of Technology and since 1890 has been associated continuously with the electrical and public utilities interests, in charge of operating and construction matters. For several years he was the head administrative officer for an important group of public utilities companies in Massachusetts and in 1909 became one of the leading men in the Stone & Webster organization of Boston. In addition to being a vice-president of the Stone & Webster Management Association, Inc., he is a director of the American Pneumatic Service Company, Lamson Consolidated Store Service Company, Boston Woven Hose & Rubber Company, Concord (Mass.) Electric Company, Paducah Traction & Light Company, Houghton County Electric Light Company, Blackstone Valley Gas & Electric Company, Haverhill Gas Light Company and Fall River Gas Works.

New I. T. S. Appointments

New appointments by the Illinois Traction System during the week ended Jan. 25 are as follows:

J. I. Catherman, engineer of maintenance of way, Springfield.

A. S. Bergschneider, superintendent of transportation, Springfield.

A. McNeil, superintendent, Decatur.

Henry C. Leutert, general agent, St. Louis.

James J. Dooley, traveling freight and passenger agent, St. Louis.

F. J. Blaicher, contracting agent, St. Louis.

W. M. Long, traveling freight and passenger agent, Peoria.

C. E. McGuire, general agent, Decatur.

H. H. Happe, city freight and passenger agent, Springfield.

E. L. McKee, general agent, Springfield.

George Palm has been appointed general manager and purchasing agent of the Southern Cambria Railway, Johnstown, Pa., to succeed C. A. Houghton.

J. A. Trawick, formerly vice-president of the Appalachian Power Company, Bluefield, W. Va., has been elected president of the company to succeed R. C. Morse.

R. Broadwater, formerly vice-president of the Union Traction Company, Sisterville, W. Va., has been elected president of the company to succeed H. W. McCoy.

K. K. Garrett has been appointed manager and purchasing agent of the Hanover & McSherrystown Street Railway, Hanover, Pa., to succeed E. H. Ramsbotham.

Curnal Fox has been appointed master mechanic of the Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa., to succeed William Sheldon.

S. H. J. Reid has been appointed secretary, treasurer and general freight and passenger agent of the Brantford (Ont.) Municipal Railway to succeed John Creasser.

Paul McKay has been appointed secretary and treasurer of the Spokane & Inland Empire Railroad, with headquarters at Portland, Ore., to succeed W. G. Davidson.

C. Bibby, secretary of the Sudbury, Copper Cliff & Suburban Electric Railway, Sudbury, Ont., has also been appointed treasurer of the company to succeed L. O'Connor.

George K. Hyde has been appointed purchasing agent of the Toronto & York Radial Railway and the Schomberg & Aurora Railway, Toronto, Ont., to succeed Walter C. Douse.

A Nevin Pomeroy has been elected vice-president of the Chambersburg & Shippensburg Railway, Chambersburg, Pa., to succeed C. P. Miller, who still retains the position of treasurer.

Charles Basse has been appointed auditor of the Arkansas Valley Interurban Railway, with headquarters at Wichita, Kan., vice H. M. Dobbins, resigned to engage in other business.

Harry S. Calvert, secretary and general manager of the Westmoreland County Railway, Pittsburgh, Pa., has also been appointed treasurer of the company to succeed Joseph G. Vilsack.

Charles B. Attlesey has been appointed acting division superintendent at the Ninth Avenue depot of the Brooklyn (N. Y.) Rapid Transit Company, to succeed the late Henry Mueller.

M. H. McLean, secretary of the Harris Trust & Savings Company, Chicago, Ill., has been elected a vice-president of the Des Moines City Railway and the Inter-Urban Railway, Des Moines, Iowa.

E. R. Heiny has been appointed superintendent of the Arkansas Valley Interurban Railway with headquarters at Wichita, Kan., vice Charles A. Stanley, resigned to accept services elsewhere.

Francis Tingley has been appointed superintendent of construction of the Altoona & Logan Valley Electric Railway to succeed F. D. Hain, who some time ago was appointed engineer of the city of Altoona.

R. J. Semsch, local auditor of the Wisconsin Railway, Light & Power Company at La Crosse, Wis., has been appointed chief clerk to the general manager, in charge of the La Crosse office. This position is a new one.

Alba H. Warren, formerly manager of the Galveston (Tex.) Electric Company, a Stone & Webster property, has been transferred to El Paso, where he has been made manager of the El Paso Traction Company, also owned and operated by Stone & Webster.

J. D. Callery, formerly one of the receivers of the Pittsburgh (Pa.) Railways, and chairman of the board of the Philadelphia Company, has been elected vice-president of the Beaver Valley Traction Company, New Brighton, Pa., to succeed J. H. Reed.

Josiah M. Billing, who has been chief clerk in the office of the Montgomery Light & Water Power Company, Montgomery, Ala., for some time, has been promoted to the position of secretary and treasurer of the Athens Railway & Electric Company, Athens, Ga.

Albert McNeil, who has been chief dispatcher for the Illinois Traction System at Decatur, Ill., for the last seven years, has been made superintendent of the lines of the company in that city to succeed A. S. Bergschneider, transferred to Springfield.

A. S. Bergschneider, who has been superintendent of the Illinois Traction System at Decatur, Ill., for a number of years, has been appointed superintendent of transportation of the company with offices in Springfield. He succeeds F. R. Edmonston, who has gone to the Wabash Railway at Moberly, Mo.

Alexander Shapiro, who for the last four and one-half years has been connected with the secretary's office of the American Electric Railway Association as research assistant and statistician, has been forced to resign on account of ill health. He has been undergoing a rest cure and is reported to be recovering rapidly.

Lieut. W. T. Waters, Jr., advertising manager of the Georgia Railway & Power Company, Atlanta, Ga., and editor of *Here We Are*, published by that company, is back in America after a long stay in France. Lieutenant Waters, it is expected, will resign from the service soon and return to the company in his former capacity.

Paul Stark has been appointed auditor of the Eastern Wisconsin Electric Company, with headquarters at Sheboygan, Wis., to succeed William E. McGovern, who resigned to undertake government work at Washington in the late summer. Mr. Stark was formerly connected with the accounting department of the Public Service Commission of Indiana.

William B. McKinley, president of the Illinois Traction Company, Peoria, Ill., and Congressman from the Nineteenth Illinois District, is mentioned as a candidate to succeed United States Senator Lawrence Y. Sherman, who has decided that he will not be a candidate for re-election upon the completion of his present term.

Brig.-Gen. Henry Worth Thornton, formerly general superintendent of the Long Island Railroad, has been raised to the knighthood by King George in recognition of his services to the British nation during the war as general manager of the Great Eastern Railway of England. Only a few months ago Mr. Thornton was promoted from a colonel to a brigadier general in the British army.

B. F. Wickersham has been appointed general manager and purchasing agent of the West Chester, Kennett & Wilmington Electric Railway, Kennett Square, Pa., to succeed Hamilton Baluss, who, as noted in the issue of the ELECTRIC RAILWAY JOURNAL of July 20, 1918, resigned to accept a position with the United States Ordnance Department as army chief inspector at Philadelphia, Pa.

Edwin W. Clapp, former superintendent of the Bristol & Norfolk Street Railway, Randolph, Mass., who entered the employ of the Bay State Street Railway, Boston, Mass., five months ago, has been advanced to head of the safety department with offices in Boston. Mr. Clapp was a former Bay State Street Railway employee at South Braintree and was superintendent of the Bristol & Norfolk street railway for three years.

J. P. Tretton has been appointed superintendent of transportation of the Indianapolis Traction & Terminal Company, Indianapolis, Ind. Mr. Tretton has been connected with the company since 1899, when he began work in the truck department at the repair shops. He was appointed storekeeper in 1902; paymaster in 1906; schedule maker for the transportation department in 1907; and has been assistant superintendent of transportation since 1908.

John I. Catherman, formerly assistant engineer of maintenance of way of the Illinois Traction System, Peoria, Ill., who has been in military service for the last year, has been appointed head of the maintenance of way department with headquarters at Springfield, Ill. Mr. Catherman succeeds L. B. Martin, who was recently named general superintendent of the Illinois Traction System. Mr. Catherman was with the Pennsylvania Lines for some time before he became associated with the Illinois Traction System in 1913.

Homer Loring has been elected chairman of the recently appointed trustees of the Eastern Massachusetts Street Railway, the proposed successor to the Bay State Street Railway, Boston, Mass., under the conditions set forth in the ELECTRIC RAILWAY JOURNAL for Jan. 25, page 210. The trustees will not assume the responsibility of operating the property until it has been transferred to the new company, probably about April 1. In the meantime, they will study the many problems of the system and co-operate with the various committees in completing the reorganization plans.

Major Joseph Caccavajo, who organized the Nineteenth United States Engineers, has returned to New York from the French battle front. The major, prior to entering the national service, was consulting engineer for New York City subway construction. He wears the Croix de Guerre, awarded him for extraordinary bravery and heroism at the Champagne front. Major Caccavajo was a member of the general staff of the Thirty-sixth, comprising Texas and Oklahoma national guardsmen. He was in command of the American camp near Brest, at which 36,000 troops were landed daily.

Capt. J. C. McPherson, just returned from army service with the railroad engineers in France, has been made assistant general superintendent of the

Pacific Electric Railway, Los Angeles, Cal. Capt. McPherson served with the Pacific Electric as motorman, dispatcher and in various official positions, including superintendent, from 1895 to 1913. In June, 1913, he was transferred to Oakland as superintendent of the electric lines of the Southern Pacific Company, which also controls the Pacific Electric Railway. He remained at Oakland until he received his commission with the army. Immediately thereafter he was sent to France and for a time was superintendent of terminals at Bordeaux, the port through which an immense volume of supplies for the American army was handled.

F. R. Edmonston has resigned as superintendent of transportation for the Illinois Traction System at Peoria, Ill., to become connected with the Wabash Railroad at Moberly, Mo. Mr. Edmonston had jurisdiction over all the lines west and north of Decatur and South of Springfield. He was born in Galloway County, Mo., on Dec. 1, 1878. He was connected with the Chicago & Alton Railroad at various places on the Kansas City division as student operator and agent from April, 1894, to September, 1896. He was with the Wabash Railroad at various places on the Kansas City division as telegraph operator, agent, trainmaster, clerk and train dispatcher from September, 1896, to September, 1907. He next entered the service of the Missouri, Kansas & Texas Railroad, with which he continued from September, 1907, to March, 1913. He was appointed division superintendent of the Illinois Traction System, northern division, on March 10, 1913, and served in that capacity until Aug. 1, 1914, when he was appointed superintendent of transportation with jurisdiction as noted previously.

J. D. O'Keefe, recently appointed receiver of the New Orleans Railway & Light Company, New Orleans, La., is second vice-president of the Whitney-Central National Bank, that city. For three years Mr. O'Keefe handled one of the biggest receivership proceedings ever instituted in the Federal Court at New Orleans—that of the Frisco railroad. He is a man of wide experience in such matters, has the complete confidence of the public, and enjoys also the confidence of the financial interests involved in the railway receivership. Moreover, he is especially competent to deal with the labor situation. During the Frisco receivership when the Southern Pacific strike took place, and the Frisco car repairers refused to work because they thought they were being used to repair cars from roads on which the men were on strike, Mr. O'Keefe settled the matter very quickly and satisfactorily. Only recently he successfully handled labor troubles at the plant of the New Orleans Dry Dock Company, of which he is managing secretary. Mr. O'Keefe was at one time a member of the Dock Board of New Orleans, holding a public office very successfully. His experience has thus covered many lines of endeavor.

E. K. Stewart has resigned as vice-president and claim adjuster of the Columbus Railway, Power & Light Company, Columbus, Ohio. Mr. Stewart was formerly general manager of the road, but relinquished that office some time ago that he might accept duties somewhat less arduous. Mr. Stewart was born in Columbus in 1845. His educational advantages were confined to the common schools of that city. His first work was in a bank. He continued in this line until he became cashier of the P. Heyden & Company Bank. For several years he had held a financial interest in the East Park Place Street Railway, Columbus, which later became the Long Street line. This property was included in the Main and High Street consolidation and Mr. Stewart remained as an officer of the company. In 1892 he was made vice-president and general manager of the Columbus Street Railway, the first of several local consolidations. He retained that place and title in each succeeding enlargement of railway activities in the city. Mr. Stewart is president of the Case Crane Company and of the Columbus Dry Goods Company, vice-president of the Union National Bank and a director of the Columbus Gas Light & Heating Company, the Citizens' Savings & Trust Company, and other institutions. Mr. Stewart thus closes a career of more than twenty-five years with the local railways.

R. M. Howard, manager of all departments of the Wisconsin Railway, Light & Power Company, except the La Crosse Street Railway, has been appointed general manager for the company at La Crosse, succeeding Dean Treat, who resigned. Mr. Howard will co-operate with Peter Valier, vice-president, who will be resident executive officer, having jurisdiction over all departments including Winona and Hatfield. Mr. Howard has been with the Wisconsin Railway, Light & Power Company since it was organized in 1913, having previously held the same position for two years with the receiver of the La Crosse Water Power Company. He has heretofore had charge of the power and electrical department of the company, including the Hatfield dam, the hydro-electric power station, the power transmission lines from Hatfield to La Crosse and Winona, the substations and distribution system in La Crosse, the Onalaska electric utility and steam power stations and electric distribution system in Winona, and the Winona Street Railway. Prior to becoming connected with the Wisconsin Railway, Light & Power Company, Mr. Howard was general manager of the Green Bay Traction Company, the Green Bay Gas & Electric Company and the Northern Hydro-Electric Power Company, Green Bay, which have since been consolidated under the name of the Wisconsin Public Service Company. Before going to Green Bay, Mr. Howard was general manager of the Clinton (Iowa) Street Railway for nine years. The Wisconsin Railway, Light & Power Company is one of the group of properties controlled by the Clement C. Smith interests.

J. P. H. De Windt, formerly chief of the transit bureau of the Public Service Commission for the First District of New York, will continue with the Pratt Engineering & Machine Company, Atlanta, Ga., in the capacity of chief of construction. In the spring of 1918 Mr. De Windt was requested by the Pratt Engineering & Machine Company to assume charge as field executive of the construction of a $7,000,000 picric acid plant at Little Rock, Ark., being erected and equipped for the government. In order to take up this work Mr. De Windt was granted a leave of absence without pay for three months by the Public Service Commission. At the expiration of this period, however, the work had not been completed and as Mr. De Windt's further services were essential to the carrying out of the construction the government authorities refused to release him. In consequence he tendered his resignation to the commission effective on the expiration of his leave of absence. Mr. De Windt was for some time vice-president and general manager of the Birmingham Railway, Light & Power Company, Birmingham, Ala., and while with that company was assigned in addition to his regular duties to considerable engineering work with the American Cities Company, by which the Birmingham property is controlled. As noted previously in the ELECTRIC RAILWAY JOURNAL, Mr. De Windt has been succeeded with the Public Service Commission by George F. Daggett, former assistant secretary of the commission.

Obituary

A. R. Walbridge, recently appointed receiver for the St. Paul (Minn.) Southern Electric Railway, died at his home in Hastings, Minn., on Jan. 15. Mr. Walbridge was prominent in Hastings in business and social circles and was also well known in St. Paul and Minneapolis. He is survived by his widow and two daughters.

Percy Dwight Henders, auditor for the Chicago, Ottawa & Peoria Railway, Ottawa, Ill., died recently at his home in Ottawa, following an illness of several months. Mr. Henders was born in Ottawa in 1882, and practically all his life has been spent in that city. His education was obtained in the schools of Ottawa and the University of New York. After fitting himself for commercial life, he entered the employ of George W. Reed & Company, later going with the First National Bank. Eleven years ago he became connected with the Chicago, Ottawa & Peoria Railway and was advanced several times, finally becoming auditor.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Prevailing Condition in Wire Market

New Standards Discontinue Certain Grades in Small Sizes—Easier Manufacture of Circ.Mil Sizes

January is hardly the time of year to look for heavy buying in the wire market. While the month has provided few orders of a large size, it has created a market for small amounts in many instances. Only absolutely necessary extensions have been made, but considerable maintenance and repair work has been carried into effect.

Steadiness in Price Anticipated

With the departure last week of the committee of copper producers for Europe, the price of copper will probably hold rather steady until word from them is received. Since the price of wire depends largely on the price of the base copper, as soon as the large buyers have decided that the bottom level has been approximately reached, the larger orders may be expected to come in. The price of copper in most cases has been on a 23-cent base, but one case is known when it has been as high as 27. Some of the smaller producers have been selling as low as the 20-cent base, but it is probable that as soon as their stock becomes pretty well depleted they will raise their price somewhat. Quotations in the open market this week went below 20 cents for spot shipments of electrolytic. Little copper is being sold to the wire manufacturers, as their stocks as a rule are ample for current production at prevailing wire prices.

Inquiries Show Satisfactory Condition

There have been many inquiries received by the larger wire producers for quotations on large orders. One manufacturer has a standing order which is to take effect when he, the manufacturer, is satisfied that copper has become satisfactorily low and stable.

Some inquiries on bare trolley wire have come from South American countries. In the South the month of February should begin to show an increase, but throughout the country generally buying in any large amounts will probably not be felt before March and April. Where in season there would be found an order for 30 or 40 miles of trolley wire, there is now found nearer 2 or 3 miles.

There have likewise been inquiries for copper-clad trolley wire for both foreign and domestic use. Until the metal market shall have found itself substitutes are being used. There have been cases where bare copper wire has been used, although copper-clad may have been more desirable, just as where in one case in South America condenser tubes have recently been made of iron, even with their short life, as being cheaper in the end than present copper. Deliveries in bare trolley wire are running three to four weeks, as it is not stocked; it is, however, kept in rods.

Considerable standardization on rubber-covered wire and cable has been effected. Code, 30 per cent and 40 per cent are insulation standards. No. 8 B. & S. gage and smaller rubber-insulated N. E. C. with double braided wire and twin wire will not be manufactured. Single-conductor single-braid will be substituted therefore. The number of standard colors of flexible cords has been limited to black, green, yellow, red and white. Lamp cord and brewery cord are the standard types of N. E. C. flexible cords.

Change in Wire Standards

In the manufacture of stranded conductors cables of even diameters have been eliminated and approximate diameters substituted therefor. Thus where 400,000 circ.mil is called for a cable of thirty-seven strands of No. 10 B. & S. gage wire, giving 384,095 circ.-mil will be sold The same will hold good for other sizes. In some cases the approximate size will be nearer the even hundred than in the above instance, but in no case will it be very far off. There are the same number of steps between the present No. 16 and 2,000,000 circ.mil as formerly, and each step approximates more or less closely the former corresponding step.

Railway Material for Sale by Government

Equipment valued at $10,000,000 and owned by the United States Spruce Production Corporation, with headquarters in Portland, Ore., is to be sold and sealed bids for the same will be received by the sales board in the Yeon Building in that city up to Feb. 15.

The equipment, which consisted of everything from picks and shovels to complete railroads and mills, contains many items of interest to the electric railway field, as follows: A. C. motors, 440-volt, three-phase, 60-cycle, 3 to 75 hp., with or without starters; 2581 tons new 60-lb. rails; 5030 tons 67½-lb. new rails; 2910 tons new 80-lb. rails, besides a number of standard automobile trucks of 1½ to 5-ton capacity.

Outlook on Rail Bonds Hopeful

Further Reduction This Past Week Said to Bring Price to Bottom Level

This track accessory has pretty consistently followed copper in price movement for some time. When copper, the cost of which enters so materially in the cost of the finished bond, rose some time ago the rail bond's cost followed it up, and came down with it early this winter. In the last two months discounts from list for rail bonds have increased from 10 per cent to 17½ per cent, and early it was brought up to 20 per cent. With this last drop in price it is predicted in the trade that the bottom level has been reached.

Distributers are of the belief that buying should be quite active this spring as electric railways have not kept their maintenance in this line up to the standard for the past four years. Most new orders from traction systems for bonds, the trade reports, have been for short extensions, no large new lines having been laid.

There have been many inquiries received by manufacturers for quotations on fair sized orders for this country, and others have come through from Europe, notably France, Spain and Sweden. There is no difficulty with deliveries as in most cases they could come from stock.

Mild Winter Easy on Car Glass

Although there has been a very dull market for car window glass in the United States, within the last two weeks 125,000 boxes of glass have been reported on order from France. How much of this will find its way into rolling stock is not known, but returning soldiers bring reports that French rolling stock is virtually being operated as open cars. Discounts on car window glass, single strength, A and B quality, remain at 77 per cent, while double strength remains at 79. Maintenance orders have been the only ones of account from the traction systems. Ordering for one month's requirements is now taking the place of the former practice of placing orders for six months' requirements by one elevated railway in the East. The very open and mild winter in the East has had considerable to do with the small maintenance orders.

Little car window glass is being stocked either at the factory or locally. Orders are being filled at the factory in from two to three weeks.

Trade Notes

W. J. Ritchie & Company, Sheffield, England, steel manufacturers and engineers, have moved their London office to 9 New Broad Street, E. C. 2.

Steel City Electric Company, Pittsburgh, Pa., has appointed R. S. Wakefield its representative at Dallas, Tex.

William K. Swift, Philadelphia, Pa., has become associated with the sales department of the Bound Brook Oilless Bearing Company, Bound Brook, N. J.

Phoenix Utility Company, 71 Broadway, New York City, is the new name for the Phoenix Construction Company. This company, which handles used machinery and equipment, had its name changed because of the existence of two different construction companies with the same name.

J. C. Hill, pioneer street car advertising man of Kansas City, and for twenty-four years head of the Central Advertising Company, has recently announced his retirement from the active advertising field, and the disposal of his interests in the company to Barron G. Collier of New York. Mr. Hill is retained on the board of directors of the Central Advertising Company and will maintain his office at 311 Bryant Building. He did much to bring street car advertising to a high level and incorporated many new ideas.

Roller-Smith Company, New York City, announces the appointment of James E. Wood as manager of its Cleveland office, located at 711 Williamson Building. Mr. Wood assumes the position formerly held by C. S. Ripley. Mr. Wood has been engaged in telephone development, first with the Screw Machine Products Corporation of Providence and later with the Western Electric Company at Chicago. Recently he has been with the government in radio work. The Roller-Smith Company also announces the opening of a Detroit office in the New Telegraph Building, in charge of C. H. Nicholson, who was formerly connected with the Chicago office of the company. During the war Mr. Nicholson was with the Signal Corps.

Drew Electric & Manufacturing Company, Indianapolis, Ind., manufacturer of line materials and electric railway supplies, announces the appointment of R. B. McDonald as sales engineer. Mr. McDonald has been previously identified as an engineer in the electric and traction field and his past experience and knowledge of engineering requirements will again be available with Drew specialties. Frederick B. Schafer, formerly advertising and sales counsel on the staff of the McGraw-Hill engineer publications, will direct the publicity and sales of the Drew company. The Drew Electric & Manufacturing Company has completed its biggest year and enters the new year with the most promising plans. In the opinion of James H. Drew, president of the company, the central stations and the electric railway field are facing one of the most successful periods ever experienced in their history.

Rolling Stock

Stockton (Cal.) Electric Railroad will shortly begin remodeling one of its older type cars and install safety devices.

Stark Electric Railroad, Alliance, Ohio, expects to purchase this year two quadruple motor equipments and trucks for two interurban cars.

Southwestern Gas & Electric Company, Texarkana, Ark., lost its carhouse and twelve cars by fire on Dec. 21, causing a loss of about $100,000.

Evansville (Ind.) Railways, which was recently sold to the Evansville & Ohio Valley Railway Company, expects to purchase several new cars.

Bamberger Electric Railroad, Salt Lake City, Utah, has rebuilt in its own shops, six excursion cars which had been burned in the fire at the company's Ogden carhouse last May, as reported in these columns of May 25, 1918. A number of other cars are to be rebuilt so that the road will be suitably equipped with rolling stock when the resort season opens.

New Advertising Literature

Republic Engineers, Inc., 60 Broadway, New York City: Bulletin on 66,000-volt transmission line in Mahoning Valley.

Heine Safety Boiler Company, St. Louis, Mo.: Booklet, "The Heine Idea," describing its boilers and superheaters.

NEW YORK METAL MARKET PRICES

	Dec. 5	Jan. 30
Copper, ingots, cents per lb	26	19
Copper wire base, cents per lb	28.75	28.75
Lead, cents per lb	7.05	5.50
Nickel, cents per lb	40	40
Spelter, cents per lb	8.75	7.00
Tin, cents per lb	†72.50	†72.50
Aluminum, 98 to 99 per cent., cents per lb	†33.10	†33.10

† Government price in 50-ton lots or more′ f. o. b. plant.

OLD METAL PRICES—NEW YORK

	Dec. 5	Jan. 30
Heavy copper, cents per lb	21.00 to 21.50	15.50 to 16.00
Light copper, cents per lb	17.00 to 17.25	12.00 to 12.25
Red brass, cents per lb	21.00 to 21.50	9.00 to 9.50
Zinc, cents per lb	7.00 to 7.50	5.00 to 5.25
Yellow brass, cents per lb	13.00 to 13.50	7.00 to 7.50
Lead, heavy, cents per lb	5.75 to 6 00	4.50 to 4.75
Steel car axles, Chicago, per net ton	$41.52	$28.00 to $30.00
Old carwheels, Chicago, per gross ton	$29.00	$24.00 to $25.00
Steel rails (scrap), Chicago, per gross ton	$34.00	$22.00 to $23.00
Steel rails (relaying), Chicago, gross ton.	$60.00	$50.00 to $55.00
Machine shop turnings, Chicago, net ton	$16.00 to $16.50	$6.50 to $7 50

ELECTRIC RAILWAY MATERIAL PRICES

	Dec. 5	Jan. 30
Rubber-covered wire base, New York, cents per lb	34	27
Weatherproof wire (100 lb. lots), cents per lb., New York	38.75 to 40.00	30.75
Weatherproof wire (100 lb. lots), cents per lb., Chicago	38.75 to 39.76	32.76 to 36.75
T rails (A. S. C. E. standard), per gross ton	$70.00 to $80.00	$60.00 to $65.00
T rails (A. S. C. E. standard), 100 to 500 ton lots, per gross ton	$67.50	$57.00 to $60.00
T rails (A. S. C. E. standard), 500 ton lots, per gross ton	$62.50	$55.00 to $60.00
T rail, high (Shanghai), cents per lb	4½	...
Rails, girder (grooved), cents per lb	4½	...
Wire nails, Pittsburgh, cents per lb	3½	3½
Railroad spikes, drive, Pittsburgh base, cents per lb	4½	3.90
Railroad spikes, screw, Pittsburgh base, cents per lb	8	8
Tie plates (flat type), cents per lb	*3¼	3
Tie plates (brace type), cents per lb	*3¼	3
Tie rods, Pittsburgh base, cents per lb	7	7
Fish plates, cents per lb	*3¼	3
Angle plates, cents per lb	*3¼	3
Angle bars, cents per lb	*3¼	3
Rail bolts and nuts, Pittsburgh base, cents per lb	4.90	4.90
Steel bars, Pittsburgh, cents per lb	*2.90	2.70
Sheet iron, black (24 gage), Pittsburgh, cents per lb	*5.00	4.55
Sheet iron, galvanized (24 gage), Pittsburgh, cents per lb	*6.25	5.60
Galvanized barbed wire, Pittsburgh, cents per lb	4.35	*4.35

	Dec. 5	Jan. 30
Galvanized wire, ordinary, Pittsburgh, cents per lb	3 95	3.95
Car window glass (single strength), first three brackets, A quality, New York, discount †	77%	77%
Car window glass (single strength, first three brackets, B quality), New York, discount	77%	77%
Car window glass (double strength, all sizes AA quality), New York discount.	79%	79%
Waste, wool (according to grade), cents per lb	13 to 15	15
Waste cotton (100 lb. bale) cents per lb..	12½ to 13	12
Asphalt, hot (150 tons minimum) per ton delivered	$38.50	.....
Asphalt, cold (150 tons minimum, pkgs. weighed in, F. O. B. plant, Maurer, N. J.), per ton	$42.50	$43.00
Asphalt filler, per ton	$45.00	$45.00
Cement (carload lots), New York, per bbl	$3.20	$3.20
Cement (carload lots), Chicago, per bbl.	$3.34	$3.34
Cement (carload lots), Seattle, per bbl. .	$3 68	$3.68
Linseed oil (raw, 5 bbl. lots), New York, per gal	‡$1.63	$1.48
Linseed oil (boiled, 5 bbl. lots), New York, per gal	$‡1.65	$1.55
White lead (100 lb. keg), New York, cents per lb	14	13
Turpentine (bbl. lots), New York, cents per gal	64	75

* Government price. † These prices are f. o. b. works, with boxing charges extra.

‡ Bid price, no quotation.

Franchises

Cardin, Okla.—James H. McNicholas and associates have asked the City Council of Cardin for a franchise to construct an electric line on Main Street or Jefferson Highway.

Dallas, Tex.—The City Commissioners of Dallas have granted to the Dallas Railway an extension of 9 months in which to carry out the provisions of its franchise involving the expenditure of $1,200,000 in improvements and betterments. The improvements called for include extensions of several lines, two new lines, laying of heavier rails in connection with paving on several streets and betterments in the service in various respects. The new lines will be the Oakland Cemetery line and the Oak Lawn and City Hospital extensions.

Track and Roadway

Denver & Interurban Railway, Denver, Col.—A bond issue of $100,000 has been voted by the city of Fort Collins for the purchase of the local lines of the Denver & Interurban Railway in Fort Collins. Of this amount, $25,000 will be spent by the city in improvements.

Peoria & Chillicothe Electric Railway, Peoria, Ill.—At the recent annual meeting of the Peoria & Chillicothe Electric Railway, which proposes to construct a line between Peoria and Chillicothe, John F. Lynch was elected president, A. O. Brock elected vice-president, W. E. Emery re-elected secretary and E. A. Mitchell re-elected treasurer. [March 2, '18.]

Indianapolis Traction & Terminal Company, Indianapolis, Ind.—As soon as weather conditions permit concrete construction, the Indianapolis Traction & Terminal Company will begin work on permanent double tracks on South Street from Delaware Street to Virginia Avenue. In the meantime, the company will construct a temporary single track on South Street from Delaware to Alabama Streets, on Alabama to Louisiana, thence east to Virginia Avenue, for the use of the interurban cars of the Indianapolis & Cincinnati Traction Company and the Interstate Public Service Company.

Arkansas Valley Interurban Railway, Wichita, Kan.—This company reports that it plans to construct 4 miles of new track during 1919.

New Orleans, La.—A conference will be held on Feb. 27 and 28 to arrange plans for the construction of a proposed municipally-owned electric interurban railway to connect New Orleans, La., and Mobile, Ala., with all of the Mississippi coast towns. All of the cities and towns along the route of the proposed interurban will send commissioners to lay the groundwork for building the line. Among the plans to be considered will be the construction of hydro-electric plants on streams near the coast to generate current for the interurban system. The conference will arrange for estimates of the cost of the railway and take steps to prorate the bonds among the municipalities interested in the enterprise. [Nov. 9, '18.]

Kansas City (Mo.) Railways.—The citizens of Independence have voted a loan of $50,000 to the Kansas City Railways for the extension of the Independence line from its north terminus at Liberty Street to Sugar Creek.

Interborough Rapid Transit Company, New York, N. Y.—Announcement has been made by Travis H. Whitney, acting chairman of the Public Service Commission for the First District of New York, that the Clark Street subway of the Interborough Rapid Transit Company will be opened for service by April 1.

Goldsboro (N. C.) Electric Railway.—A report from this company states that it will reconstruct 1 mile of track in 1919.

Columbus, New Albany & Johnstown Traction Company, Columbus, Ohio.—This company reports that during 1919 it will reconstruct 1½ miles of track.

Windsor, Essex & Lake Shore Rapid Railway, Kingsville, Ont.—A report from the Windsor, Essex & Lake Shore Rapid Railway states that during 1919 it expects to replace the trolley wire on 36 miles of its line or install steel auxiliary wire under its present trolley wire. The company will also replace 10,000 ties.

London (Ont.) Street Railway.—This company reports that it will purchase 2 miles of No. 00 wire during 1919.

Dallas (Tex.) Railway.—Announcement has been made by the Dallas Railway that it is ready to proceed with the improvement of its tracks on Jefferson Avenue from Lancaster Avenue to Polk Street, a distance of about 2 miles, in connection with the repaving of this thoroughfare. The company will lay heavier rails and pave that portion of the street between and under its tracks. This is the largest paving job to be undertaken by the city this year and will involve an expenditure of nearly $200,000 by the traction company.

Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va.—This company reports that during 1919 it expects to purchase 2900 ft. of 500,000-circ.mil feeder cable, 5400 ft. of 300,000-circ.mil feeder cable and 32,000 ft. of 4/0-circ.mil feeder cable.

Seattle, Wash.—Plans are being worked out and will be recommended to the Public Service Commission of Washington by R. H. Thomson, former city engineer of Seattle, for the construction of two large freight yard terminals, one to serve Seattle and Tacoma and another to be accessible on north to Seattle and Everett, in order to relieve the congestion of freight at Puget Sound centers. Tentative plans provide for the electrification of all rail lines serving the proposed terminal facilities.

Power Houses, Shops and Buildings

Fort Smith Light & Traction Company, Fort Smith, Ark.—The Fort Smith Light & Traction Company has completed an addition to its boiler room and has installed one 600-hp. B. W. boiler and one 3000-kva. General Electric generator.

Hagerstown & Frederick Railway, Hagerstown, Md.—Fire recently destroyed the substation and warehouse of the Hagerstown & Frederick Railway at Myersville. Plans are being made for rebuilding the structures.

Boston (Mass.) Elevated Railway.—The Public Service Commission of Massachusetts has granted the Boston Elevated Railway an extension of time until July 1 in which to begin construction of subway and terminal facilities in connection with the continuation of the elevated railway service to Everett. The actual building of the new line from Sullivan Square is practically completed, and is expected to be in operation with a temporary terminal in Everett within two months.

Southern Power Company, Charlotte, N. C.—It is reported that the Southern Power Company, which furnishes energy to the Piedmont & Northern Railway, will begin a mammoth power development on the Catawba River early in the summer. According to the report, two big dams and power plants will be built—one at Rhodhiss and the other at Horseford Shoals, 2 miles below Rhodhiss.

Oklahoma (Okla.) Railway.—A new turbo-generator is being installed by the Oklahoma Railway in its Belle Isle power house, at an approximate cost of $125,000. A new automatic machine for shoveling coal has also been installed at the power plant at a cost of $75,000.

Pennsylvania Central Railway, Johnstown, Pa.—This company reports that during 1919 it will purchase one 1200-volt d.c. rotary converter equipment for its power house.

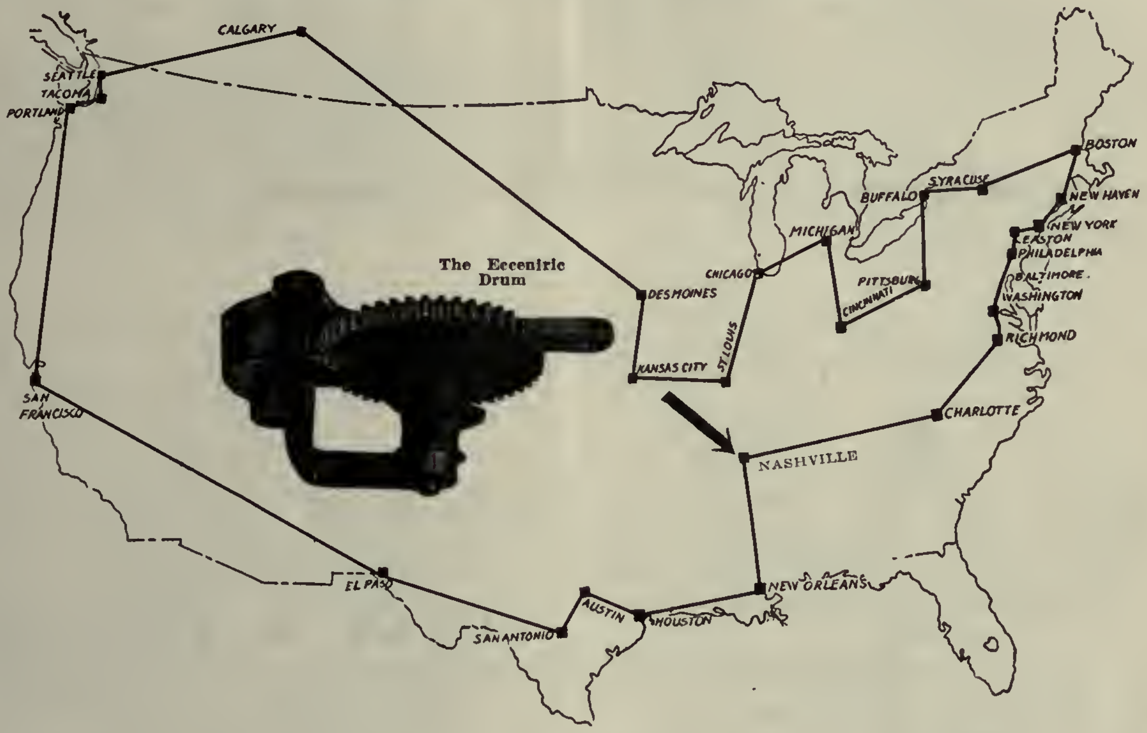
Bamberger Electric Railroad, Salt Lake City, Utah.—This company contemplates purchasing one automatic substation equipment to convert present manual control.

Lewiston-Clarkston Transit Company, Clarkston, Wash.—This company reports that it will purchase a new motor generator set.

Puget Sound Traction, Light & Power Company, Seattle, Wash.—Plans are being prepared by the Puget Sound Traction, Light and Power Company for the construction of a one-story concrete structure to be built at the Jefferson Street substation to house lightning arresters.

Tacoma (Wash.) Municipal Railway.—A report from the Tacoma Municipal Railway states that a new 1000-kw. motor generator set will be purchased in 1919. A new shop will be built and fully equipped.

Peacock Brakes from Coast to Coast



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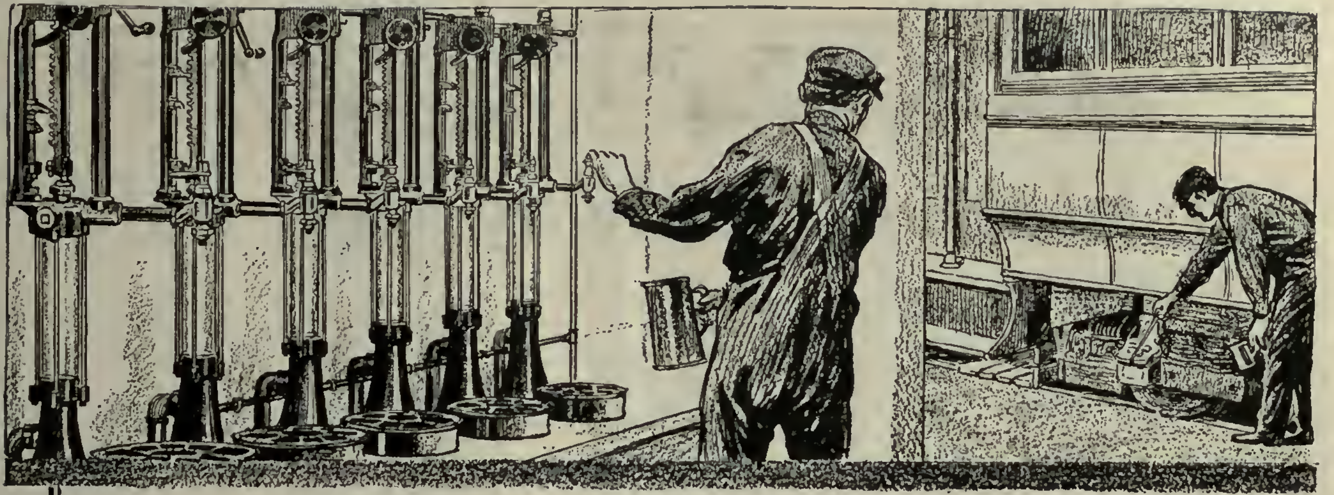

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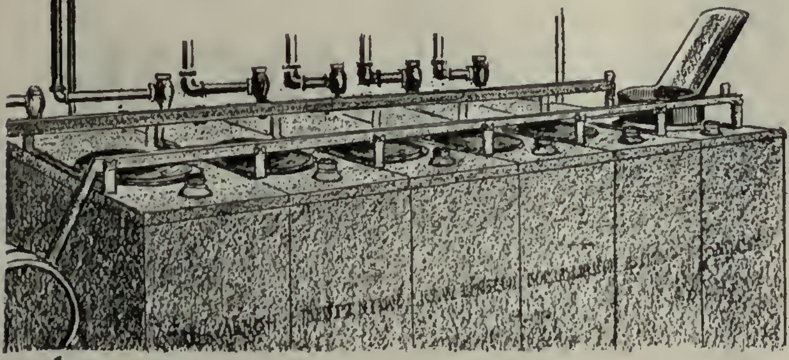

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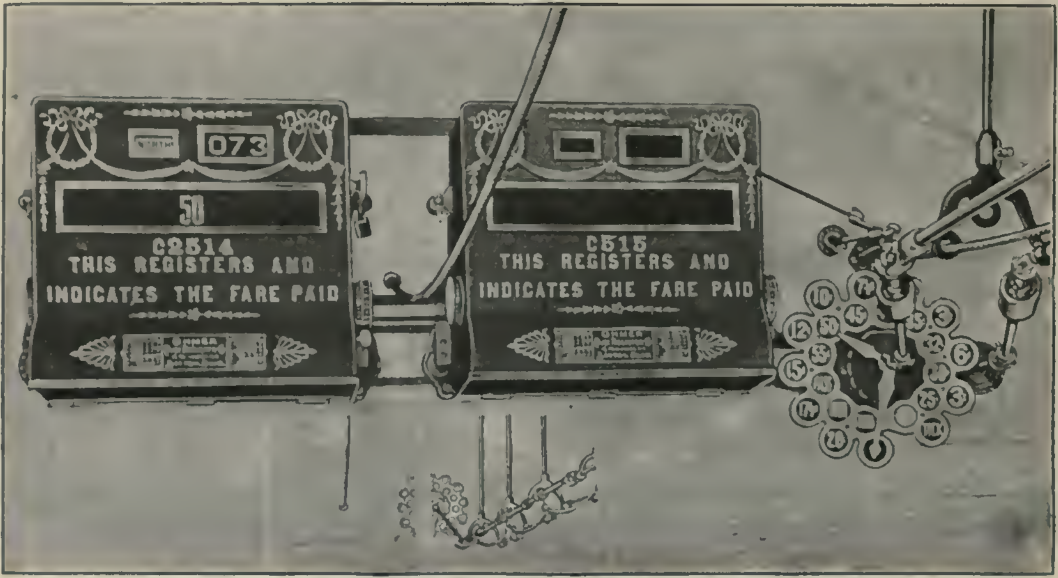

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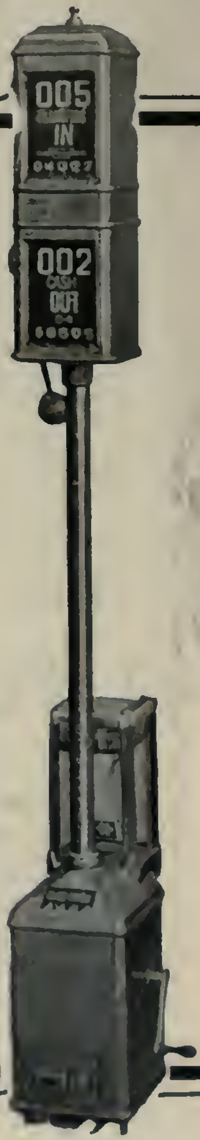

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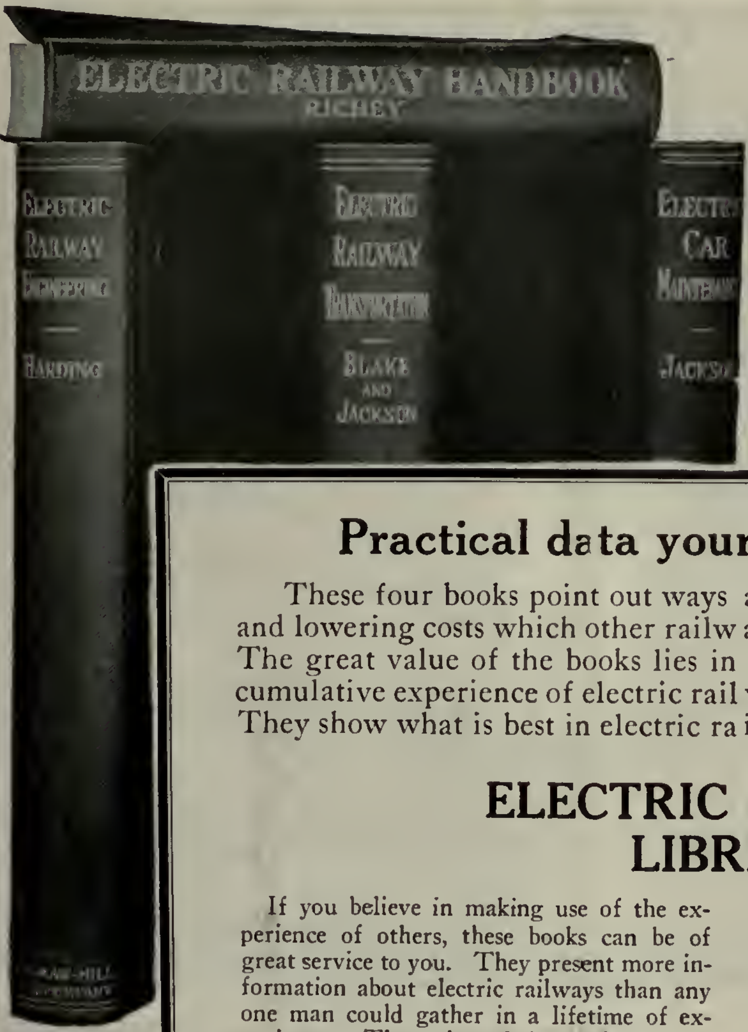
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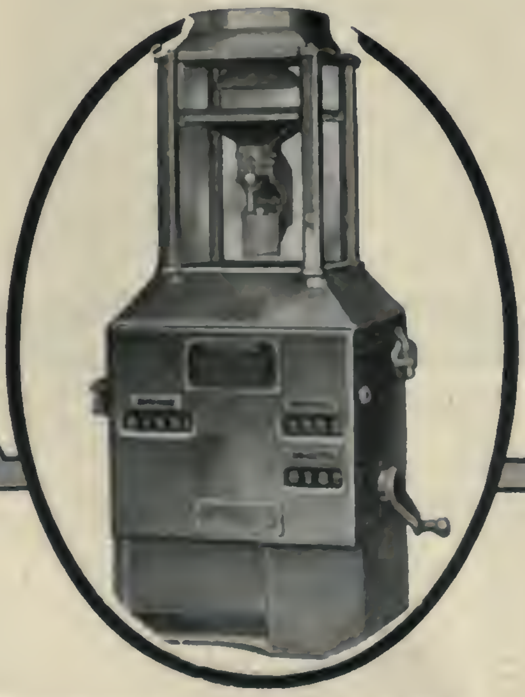

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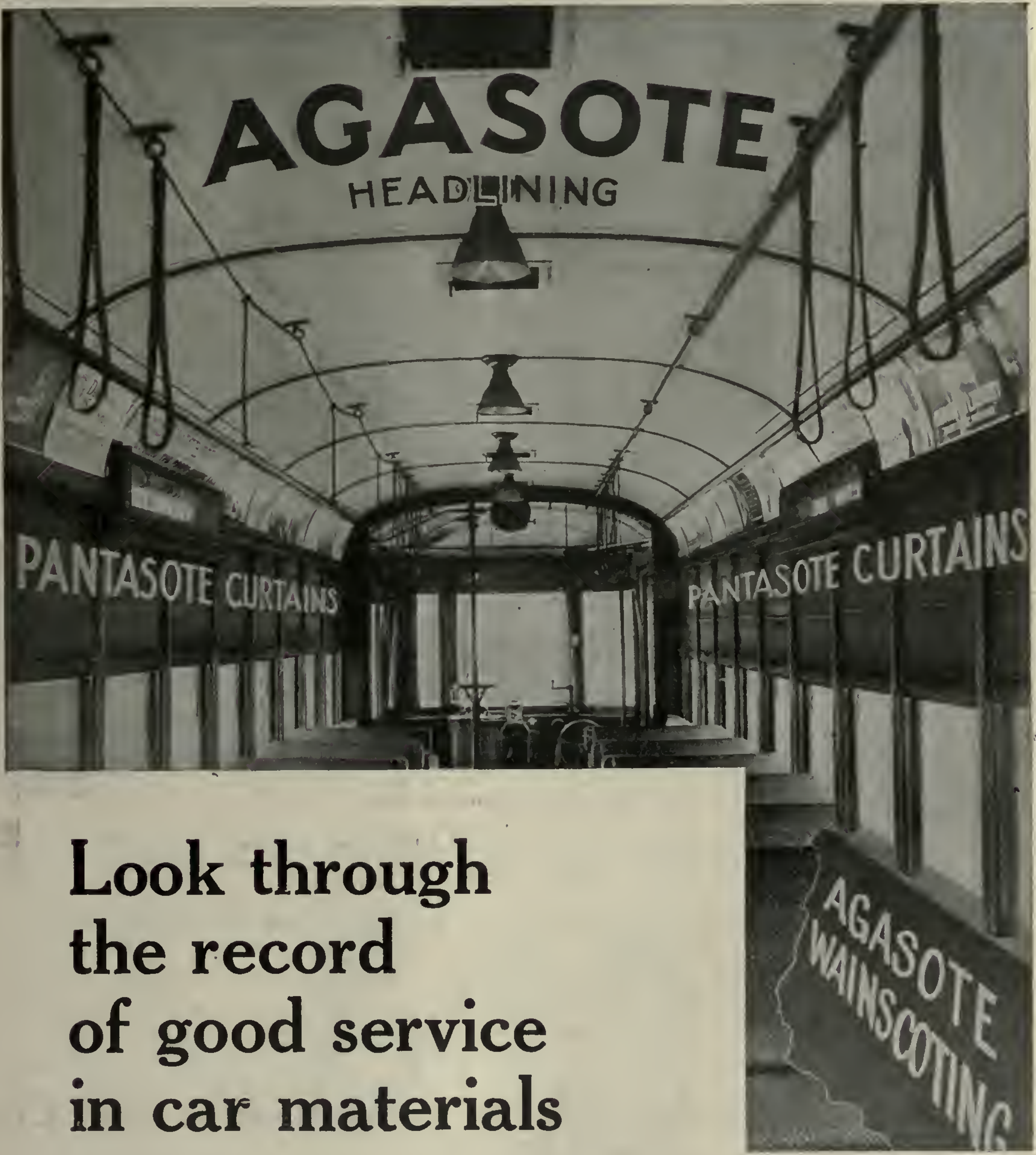

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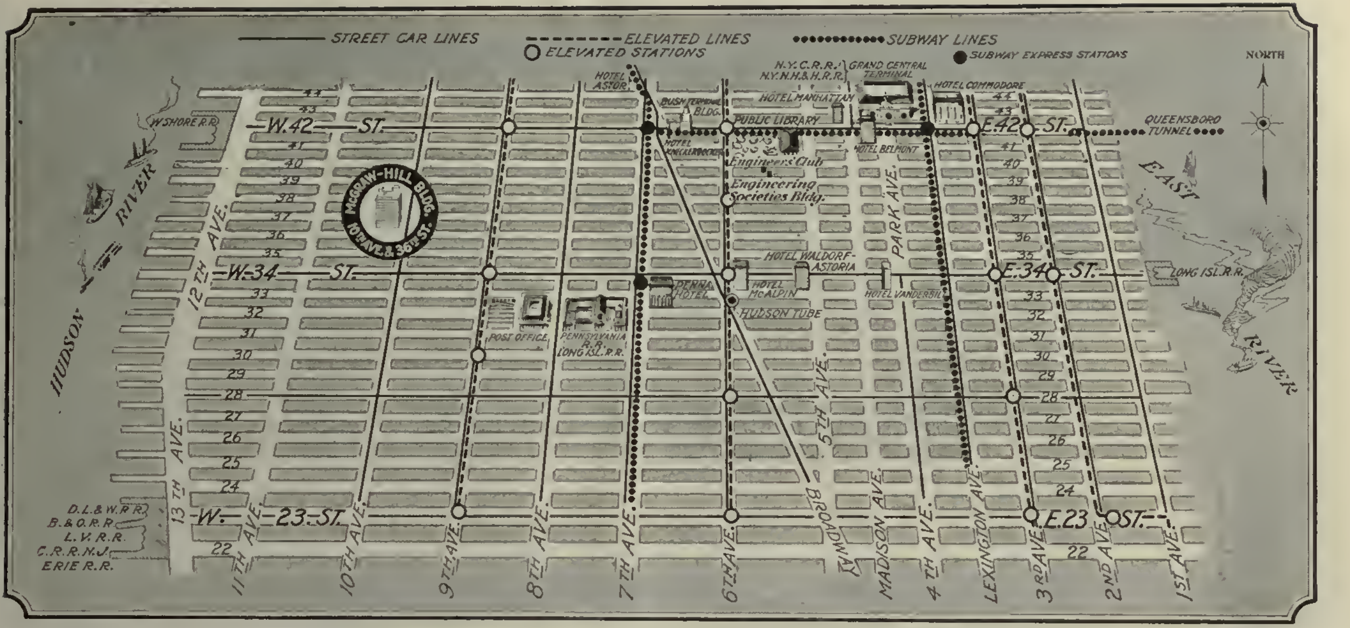

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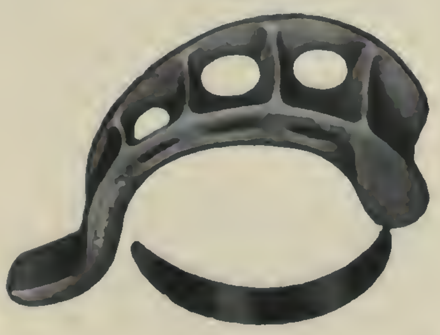

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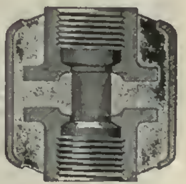

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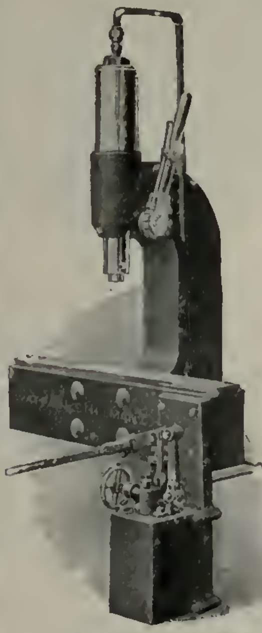

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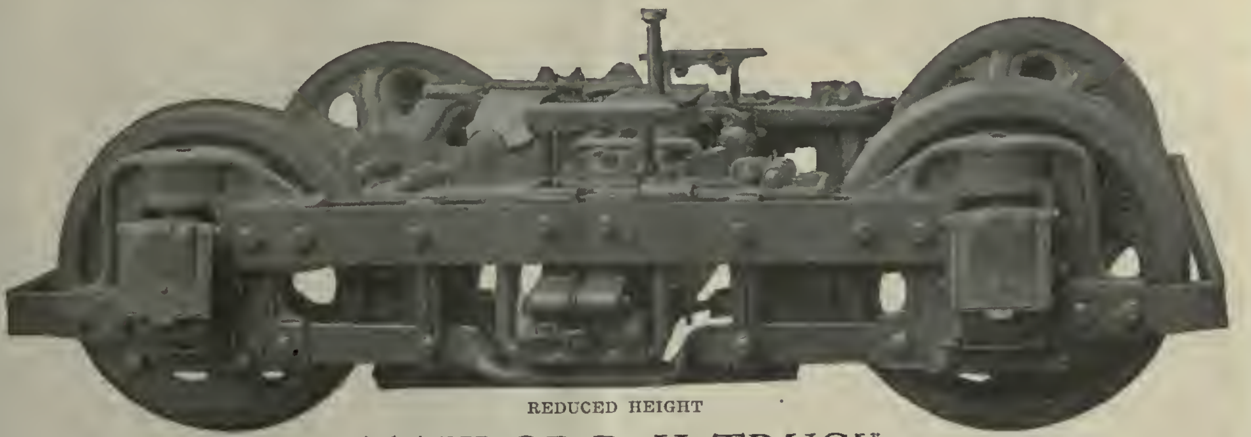

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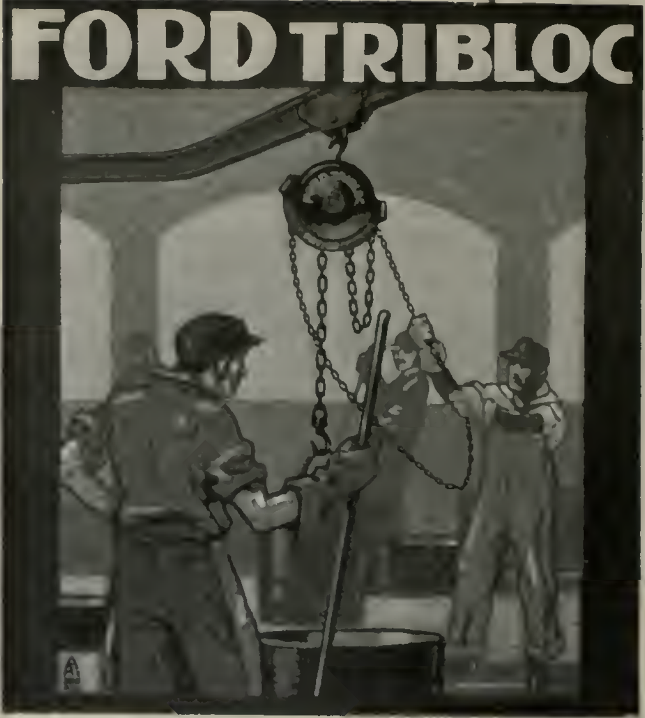

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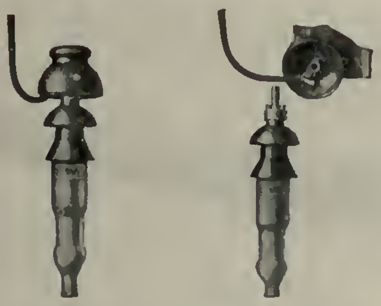

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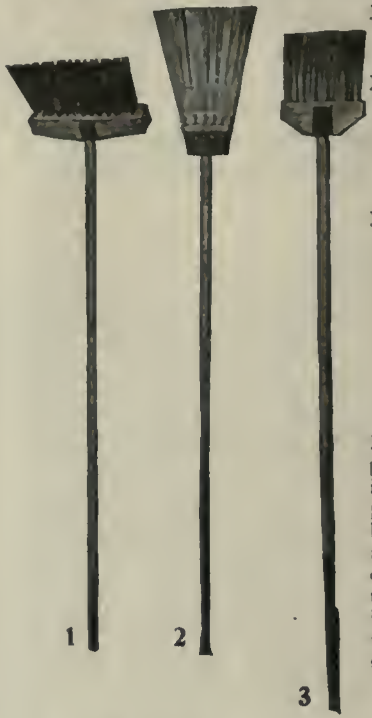

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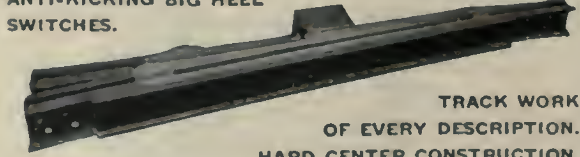

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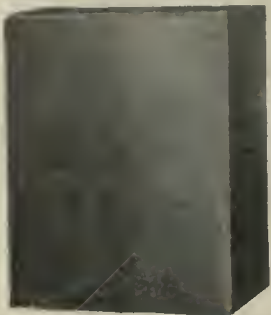

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for heavy street railway work are the best obtainable. Write for New Complete Catalogue.

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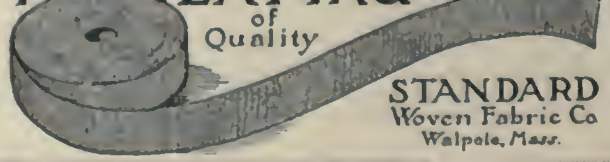


STANDARD
Woven Fabric Co
Walpole, Mass.

CASTLE LIQUID

is the only refill liquid for one quart extinguishers that is recommended for *all* makes of extinguishers.

There has been no advance in price, on the contrary because of manufacturing economies our average prices are somewhat lower than prices existing prior to our entrance into the War.

If your extinguishers are empty you are taking a desperate chance. Do not flirt with possible regret any longer. Wire your order in quick. Prompt shipment guaranteed.

Castle Liquid is sold under a broad money-back guarantee

JAMES M. CASTLE, Inc.
812 Lincoln Building, Philadelphia, Pa.

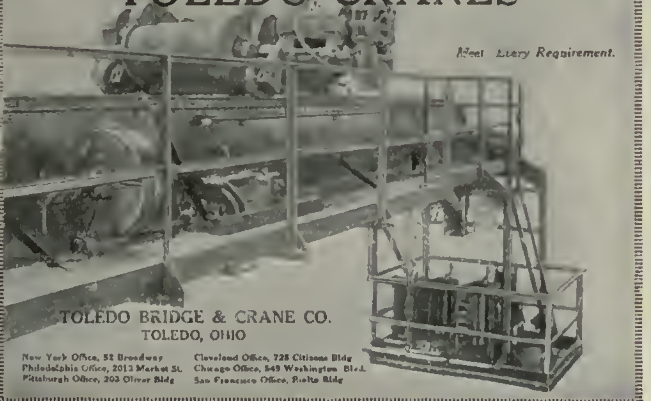
WHITING-ADAMS
BRUSHES
ALWAYS SUIT – NEVER FAIL
ALL KINDS
FOR SALE EVERYWHERE

Paint Brushes
Varnish Brushes
Toilet Brushes
Artists' Brushes
Household Brushes
Railroad Brushes

VULCAN
Rubber Cemented
Brushes

Send for Illustrated Literature
JOHN L. WHITING-J. J. ADAMS CO.
BOSTON, U. S. A.
Brush Manufacturers for Over 100 Years and the Largest in the World

TOLEDO CRANES



Meet Every Requirement.

TOLEDO BRIDGE & CRANE CO.
TOLEDO, OHIO

New York Office, 52 Broadway
Philadelphia Office, 2013 Market St.
Pittsburgh Office, 203 Oliver Bldg
Cleveland Office, 725 Citizens Bldg
Chicago Office, 549 Washington Blvd.
San Francisco Office, Rialto Bldg

NILES-BEMENT-POND CO.
111 BROADWAY, NEW YORK
MACHINE TOOLS
For Electric Railway Repair Shops

Axle Lathes
Wheel Presses
Shapers, Drills
Slotters, Planers
Steam Hammers
Electric Travelling Cranes

Send for Catalogs

JACKS

Barrett Track and Car Jacks
Barrett Emergency Car Jacks
Duff Ball Bearing Screw Jacks
Duff Motor Armature Lifts

The Duff Manufacturing Co., Pittsburgh, Pa.

HOT GALVANIZING

We guarantee immediate deliveries; reasonable prices; first class workmanship to stand any test. No tapping necessary on threads of bolts after galvanizing.
Galvanized angles cut and bent to length.

JOSEPH P. CATTIE & BROS.
Gaul and Adams Sts., Philadelphia, Pa.

Simplex Jacks
for
Railroads-Contractors-Industries
Automobiles-Pole Pulling and Ordnance
Templeton, Kenly & Co., Ltd.
Established 1899
London Chicago Paris

The Big Three
D & W Fuses, Deltabeston Wire
D & W Oil Fuse Cutouts
D & W Fuse Co., Providence, R. I.

Turn On The Light!

Nothing that is good fears the light and there is nothing *but* good in

Williams' "Agrippa" Tool Holders

"THE HOLDERS THAT HOLD"

Good design, good material, good workmanship and good service.

TOOL HOLDERS FOR

Turning
Boring
Planing
Cutting-off
Side Work
Threading
Knurling

Ask for Booklet—it's free

J. H. WILLIAMS & CO.

"The Drop-Forging People"

143 S. Clinton St.
Chicago, Ill.

143 Richards St.
Brooklyn, N. Y.

HOPE Brand *for best results*

Webbings and Tapes made from the best raw materials—made with the most up-to-date machinery and most reasonably priced. That's what you get in Hope Products.

Send for samples.

HOPE WEBBING CO.

Providence, R. I. 396 Broadway, New York

Tapes, Webbing and Sleeving

Office: 300 Brook St., Pawtucket, R. I.

REPRESENTATIVES:

Chicago—E. P. Bartlett & Co., 15 No. Jefferson St
Cleveland, Ohio—Mueller Electric Co., 423 High Ave., S. E.

WE CAN CUT YOUR COST OF

HEATING CURRENT

Write for THERMOSTATIC CONTROL INFORMATION

GOLD

ELECTRIC HEATERS Cut Installation and Maintenance Charge.
VENTILATORS Also Ventilate in Stormy Weather.
THERMOSTATS Save Current.
ORIGINATED the use of NON-CORROSIVE Wire for Electric Car Heaters.
ORIGINATED The Ventilated Coil Support.

LET US FIGURE ON YOUR NEXT REQUIREMENTS

Gold Car Heating & Lighting Co., 17 Battery Pl., New York

You will buy

CLEVELAND Fare Boxes

Eventually—

Why not now?

Cleveland Fare Box Co.
CLEVELAND, OHIO

M-R INSULATION MFG CO

"Everything in Insulation"

Mica
Vulcanized Fibre
Varnished Cloth
Insulating Tapes
Waxes
Asphalts
Compounds
Insulating Varnish

The above are only a few of our products
Write us for anything in this line you may require.

MITCHELL-RAND M'F'G CO.
183 John St., New York City

UNIVERSAL ANTI-SLIP TREADS

cars and station steps.

Universal Safety Tread Company
Waltham, Mass.

IMPERIAL WELDING AND CUTTING EQUIPMENT
OXY-ACETYLENE PROCESS

QUALITY

Welds everything in metal—cuts anything in steel or wrought iron. Excels in Speed, Safety, Efficiency and Economy. Write for Free Catalog.

The Imperial Brass Mfg. Co., 523 S. Racine Ave., Chicago

Heating and Ventilating

Let us demonstrate to you how we can heat and ventilate your cars at the lowest possible cost

The Cooper Heater Company
Carlisle, Pa.

Get Our
Price Lists on
BADGES and
PUNCHES

AMERICAN RAILWAY SUPPLY CO., 134-136 Charles St., NEW YORK

The Macdonald Cash Receipt Holder

Guards Against Errors

Over 500 Electric Interurban lines in the United States and Canada are now using The Macdonald Closed System of Cash Receipts.

Write for Details

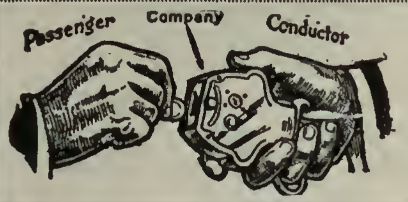
The Macdonald Ticket & Ticket Box Co., Cleveland Ohio

PS HEATERS

Car Heating and Ventilation

is one of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

The Peter Smith Heater Company
1725 Mt. Elliott Ave., Detroit, Mich.



Direct Automatic Registration
By the
Passenger

Rooke Automatic Register Co.
Providence, R. I.

"It Behooves You to Hooverize Your Motormen"

We can help you

Write to

The Arthur Power-Saving Recorder Co.
2nd National Bank Bldg., New Haven, Conn.

Electric car heaters—thermostatic contro—pneumatic car door operators—buzzers, single-stroke bells, starting signal lights—special resistances.

CONSOLIDATED CAR HEATING CO.
ALBANY, NEW YORK, CHICAGO

MASON SAFETY TREAD—lead or carborundum filled; non-slippery; prevents accidents; cuts out damage suits.

KARBOLITH CAR FLOORING—for steel cars; is sanitary, light weight, fire proof, non-slippery.

STANWOOD STEPS—Self-cleaning, non-slippery, light.

Our products used on all leading railroads, on cars and stations. For details address:

AMERICAN MASON SAFETY TREAD CO., Lowell, Mass.
Branch Offices: Boston, New York City, Philadelphia.
Agencies in all principal cities.

Use them in your terminals—
PEREY TURNSTILES or PASSIMETERS
Faster than the ticket seller

Perey Manufacturing Co., Inc.
30 Church Street, New York City

See the Crank of the

CREAGHEAD DESTINATION SIGN

By means of it, conductor or motorman can change sign without leaving platform. All that has to be done is to turn the crank. Better investigate.

CREAGHEAD ENGINEERING CO., CINCINNATI, O.

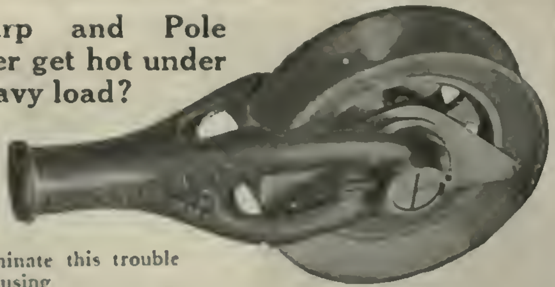
STERLING No. 12
also No. 15

All above in first class condition

Repair Parts for Registers

Repairing at Short Notice.

EXELL MANUFACTURING CO.
NEW HAVEN, CONN.



Harp and Pole ever get hot under heavy load?

Eliminate this trouble by using *Holland Harps and Wheels* "The Harp with the big Contact Spring."

THE HOLLAND TROLLEY SUPPLY CO.
1623 East 43rd St., Cleveland, O.

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.

THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

The McLain No. 25 Headlight

gives powerful road illumination, at the same time eliminating glare. It is an extended dash type light made of Pressed Steel throughout, assuring light weight without any sacrifice in strength or durability. It is absolutely waterproof, weather proof and solid.

Concentrated filament type using either a 23 or 36 watt lamp.

It's the LIGHTEST, BRIGHTEST, TIGHTEST headlight on the market and it doesn't cost any more than the others.

The Trolley Supply Co., Canton, Ohio

Railroad and Tram Car Specialties
New inventions developed, perfected
and worked for the English market

Messrs. G. D. Peters & Co., Ltd.
Windsor Works, Slough, (Bucks), Eng.

Armature and Field Coils—Armatures Rewound

Commutators
Refilled
Prompt Service

THE KING-COIL MFG. CO., CLEVELAND, OHIO

Eight Hundred and Twenty-three Equipments of N L Indicating Tail-lights Sold During the Year 1918

2323 Cars now equipped and the motormen in Cleveland, Toledo, Philadelphia, Akron and St. Joseph say it is the best thing ever put on a car to promote safety and economy.

THE NICHOLS-LINTERN COMPANY, Cleveland, Ohio, U. S. A.

RAILWAY UTILITY COMPANY

Sole Manufacturers
"HONEYCOMB" AND "ROUND JET" VENTILATORS
for Monitor and Arch Roof Cars, and all classes of buildings:
also ELECTRIC THERMOMETER CONTROL
of Car Temperatures.

141-151 WEST 22D ST.
Chicago, Ill.

Write for Catalogue

1328 BROADWAY
New York, N. Y.

Ajax Perfecto Bronze Check Plates

Made from our Perfecto Bronze — the strongest and toughest metal on the market; will bend before it will break. Withstands shocks therefore, and outlasts all other check plates several times.

Specify Ajax Perfecto Bronze on your next requisition.

The Ajax Metal Company
Established 1880
Main Office and Works: Philadelphia, Pa.
Southern Plant: Birmingham, Ala.

MORE-JONES

Armature Babbitt Metal is unusually long wearing and eliminates the tremendous expense of frequent rebabbitting.

Designed particularly for electric railway armature bearing service, and recognized the world over for unexcelled quality.

BABBITT METAL

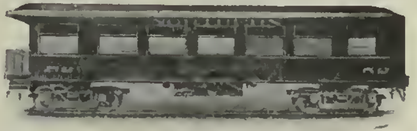
More-Jones Brass & Metal Co.
St. Louis, Mo., U. S. A.

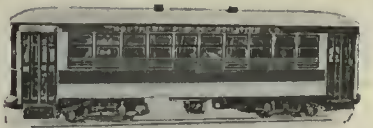
Le Carbone
Carbon Brushes are uniform. They talk for themselves.

W. J. Jeandron
173 Fulton Street
New York City

Pittsburgh Office:
636 Wabash Building

Canadian Distributors:
Lyman Tube & Supply Co., Ltd.
Montreal and Toronto





PERLEY A. THOMAS CAR WORKS
Manufacturer of Cars and Car Materials

Cars of all types from one-man to large interurban

HIGH POINT, N. C.

SASHES, DOORS
INTERIOR FINISH
VESTIBULES AND FRAMING

CURTAINS, VENTILATORS
SASH AND DOOR TRIMMINGS
DOOR AND STEP MECHANISM

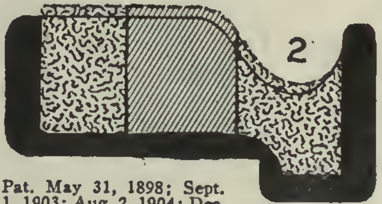
McGuire-Cummings Mfg. Company

General Offices—111 WEST MONROE ST., CHICAGO

City and Interurban Cars and Trucks,
Snow Sweepers and Plows,
Express, Combination and Work Cars,
Electric Locomotives

Wheel Condition No. 2

When the Flange and outer portion of tread need truing use this style of



Pat. May 31, 1898; Sept. 1, 1903; Aug. 2, 1904; Dec. 29, 1908; June 15, 1909; April 21, 1914.

Wheel Truing Brake Shoe

You need not keep a crew of men for wheel removal and machines for wheel truing if you use our wheel Truing Shoes.

Wheel Truing Brake Shoe Co.
Detroit Michigan

Get Your Wants into the Searchlight

ADVERTISING RATES

Ads Set in Uniform Style

(Solid, in one paragraph, without display.)

THREE CENTS A WORD, minimum charge 50 cents an insertion, payable in advance, less 10 per cent. if one payment is made in advance for four continuous insertions—for advertisements under:

Positions Wanted
Evening Work Wanted
Vacation Work Wanted
Tutoring
Salesman Wants Connections

FIVE CENTS A WORD, minimum charge $1.50 an insertion, for advertisement under:

Agencies Wanted
Agents Wanted
Business Opportunities
Desk Room for Rent
Educational
Employment Agencies
Desk Room Wanted
Foreign Business
Positions Vacant
Partner Wanted
Representations Wanted
Salesmen Wanted
Patents for Sale
Plants for Sale
Sub-Contracts Wanted
Work Wanted
Miscellaneous for Sale, for Rent or Want Ads.

THIRTY CENTS A LINE, minimum five lines, for all undisplayed advertisements set with a paragraph for each item or tabulated.

THREE DOLLARS AND SIXTY CENTS AN INCH for advertisements for bids (Official Proposals).

Ads Set in Display Type

(Individual space, within border rules.)

Space for these advertisements is sold by the inch Each page contains 30 inches. The rate per inch is based on the *total* number of inches to be used—that is, the number of inches the advertisement is to occupy multiplied by the number of insertions it is to receive. For instance, a 2-inch advertisement in 2 issues earns the 4-inch rate of $2.90 an inch. A 1-inch space in 4 issues, or a 4-inch space in one issue, also earn the 4-inch rate.

SCHEDULE OF RATES

1 to 3 in.,	$3.00 an in.	15 to 26 in.,	$2.70 an in.
4 to 7 in.,	2.90 an in.	27 to 49 in.,	2.60 an in.
8 to 14 in.,	2.80 an in.	50 to 99 in.,	2.50 an in.

Rates for larger space furnished on request.

For quick and satisfactory results
tell the reader everything that
he will want to know.

INFORMATION

ALLOW FIVE WORDS for the address, if replies are to a box number in care of any of our offices. There is no extra charge for forwarding replies.

IN REPLYING TO ADS, do not enclose original testimonials or anything that you may want returned. State your experience and qualifications in as concise and neat a manner as possible and enclose copies of your testimonials.

BE CAREFUL TO PUT ON ENVELOPE, when answering any "blind," ad, the box number in the ad, the name of the paper, and also the local address of office to which reply is sent:

36th St., at 10th Ave.,	New York
1570 Old Colony Bldg.,	Chicago
657 Leader-News Bldg.,	Cleveland
935 Real Estate Trust Bldg.,	Philadelphia
501 Rialto Bldg.,	San Francisco
519 Newhouse Bldg.,	Salt Lake City

WHEN ADVERTISING MACHINERY, use your own name and address—or a local address of some kind—so that the readers can wire direct and get quick replies. We advise also that you state in your advertisement the present location of plant that is offered for sale, or point of delivery provided you are in the market for equipment.

TO SIGN YOUR NAME and addr to your advertisement begets the confidence of the reader and facilitates receiving replies. You can, however, obviate delay in receiving answers by signing your ad. only with initials (your own or others), care of your home, your office or a post-office box number in your city.

POSITIONS VACANT

A PRIVATE secretary wanted with street railroad experience, one familiar with traffic curves, taking care of correspondence, filing, etc. Address President, Mobile Light and Railroad Co., Mobile, Ala.

A TECHNICALLY educated mechanical and electrical engineer wanted with street railroad experience, to act as assistant to the preseident and general manager of the Mobile Light and Railroad Co., Mobile, Ala.

AUDITOR and office manager wanted by street railroad operating fifty cars. P-331, Electric Railway Journal.

THREE armature winders wanted. Michigan Railway Co., Albion, Mich.

WANTED at once an experienced car barn foreman for nights in a suburban car house in a New England town. P-332, Elec. Ry. Journal.

AGENTS AND SALESMEN

Electrical Supply Salesman Wanted
With several years' experience (both in purchase and sales preferred) who commands a wide Chicago acquaintance, and an established trade can better his position byaddressing fully. AS-333, Elec. Ry. Journal, Chicago.

Do You Wish Representation in Italy?
Civil engineer wishes to represent American firm Best references. F Zucchi, 70 Via Moscova, Milan, Italy.

WANTED
FIRST-CLASS ARMATURE WINDER

Excellent position for capable man. Chance for advancement One of the best equipped shops in New England.

P331—Elec. Ry. Journal
10th Ave. at 36th St., New York City

WANTED

18-K-36-J **Controllers**
18-M. R. 11 **Circuit Breakers**

Fort Wayne & No. Ind. Trac. Co.,
Fort Wayne Indiana

POWER PLANT EQUIPMENT

FOR SALE

BOILER

1—New 338 hp. Heine Water Tube Boiler, designed for 180 lb. steam working pressure, complete with valves and trimmings. Boyer soot blower system. Steel work for front and rear suspension for 10 ft. 0 in. setting above floor line arranged to accommodate mechanical stoker; without lower front and grates; also stack supports and breeching hood for 56 in. stack, but no stack. Immediate shipment.

TURBO-GENERATOR

1—New Westinghouse 3000 kw. Maximum Rated Turbo-Generator, 3-phase, 60-cycle, 2400 volt, 903 amperes, 150 lb. steam, 27 in. vacuum, 150° superheat, 3750 r.p.m., complete with rheostat and field discharge resistance, very low steam rate. Approx. dimensions 12 ft. 3 in. x 9 ft. 10 in. x 8 ft. 3 in. high. Shipping weight 60,000 lb. Probably immediate shipment.

TURBO-EXCITER SET

1—50 kw. Westinghouse Turbo-Exciter Set to furnish direct current at 125 volt Steam pressure 150-175 lb., 2250 r.p.m. Approx. dimensions 6 ft. 8 in. x 3 ft. 10 in. x 3 ft. 10 in. high Shipping weight 5600 lb. In first-class condition and for immediate shipment.

JET CONDENSER

1—No. 8 Westinghouse LeBlanc Jet Condenser with self-contained circulating and air pump, direct connected to Westinghouse steam turbine. Pump has bronze water runner. This apparatus will condense 25,450 lb. of steam per hour with 70 degrees injection water and 27 in. vacuum. Pump will circulate 750,000 lb. of water per hour at 700 r.p.m. In first-class condition and for immediate shipment

Address
POWER PLANT
c/o Rudolph Guenther, Inc., Adv. Agency
25 Broad St., New York City

STREET CARS

(4 ft. 8½ in. gage)

3—32 ft. Closed.

Complete with equipment. First-Class. Will convert to one-man type.

4—9 Bench Open Trailers

Immediate Shipment

ZELNICKER IN ST. LOUIS

Get Bulletin 250—88 pages.
Circulation, One Quarter Million
Railway, Power Plant & Industrial Equip.

FIRST Get Bulletin 250—or, Wire

ZELNICKER IN ST. LOUIS

Before buying or selling

RAILS

Locomotives—Cars—Tanks
Machinery, Piling, etc.
What have you for sale?

Armature Coil Taping Machine

Saves Time, Labor and Money

A boy can tape 40 coils for Westinghouse 12A Armature in an hour. Further particulars gladly furnished.

Geo. M. Griswold Machine Co.
New Haven, Conn.

Keep Your Eye on the
SEARCHLIGHT
and your
Advertisements in it

10,000 Kw.
Turbo-Generator Unit
Absolutely New

10,000 Kw. Westinghouse-Parsons Horizontal Turbo-Generator Unit, 3 phase, 60 cycle, 13,800 volts, 1800 R.P.M. Can be reconnected to any other standard voltage.
Suitable surface Condenser and Condenser Auxiliaries.
We own this unit ourselves and are not acting as brokers.

Send for full details and specifications

MacGovern & Company, Inc.
114 Liberty St., New York, N. Y.
Pittsburgh Office: 498 Union Arcade Bldg.

ROTARY CONVERTERS

1—300-kw. Westinghouse Rotary Converter, 3-ph., 60-cy., 370-v. A.C., 575-v. D.C., 600 r.p.m.
1—200-kw. Westinghouse Rotary Converter, 3-ph., 60-cy., 370-v. A.C., 575-v. D.C.
1—150-kw. Westinghouse Rotary Converter, 2 or 3-ph., 60-cy., 250-v. D.C., 720 r.p.m.

TURBINE

1—500-kw. Westg. Horizontal, 3-ph., 60-cy., 370-v. (can be rewound for any standard voltage), 3600 r.p.m., with or without condensing equipment.

ARCHER & BALDWIN, INC.
114-118 Liberty St., New York, N. Y.
Telephone 4337-4338 *Rector*

FOR SALE

RAILWAY MOTORS

40 G. E. 67 Railway Motors, complete.
12 G. E. 57 Railway Motors, complete.
12 G. E. 54 Railway Motors, complete.
20 G. E. 1000 Railway Motors, complete.
16 W.H.38-B Railway Motors, complete.
14 W.H.49 Railway Motors, complete.
8 W.H.56 Railway Motors, complete.
10 W.H.68 Railway Motors, complete.
40 W.H.12-A Railway Motors, complete.

CONTROLLERS

10 K-12 Controllers.
20 K-10 Controllers.
80 K-11 Controllers.

W. R. KERSCHNER COMPANY, INC.
50 Church Street, New York City, N. Y.

CLEVELAND ARMATURE WORKS
Incorporated
Cleveland, Ohio

Everything in the Line of Repairs to Electrical Machinery

Complete Armatures. New Armatures. Rewound Armature Cores. Armature Shafts. Armature Coils. Fields and Commutators.

Established 22 Years

Cars For Sale

12 Double Truck Motor or Trailers. Brill 27-F trucks, 28-ft. closed bodies.

3 SNOW PLOWS

2 single, 1 double truck

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

RAILS

15,000 TONS—NEW and RELAYERS
NEW—12 lb., 16 lb., 20 lb., 25 lb., 30 lb., 40 lb., 60 lb., 70 lb., 75 lb., 80 lb., 85 lb., 90 lb.

RELAYERS—30 lb., 35 lb., 40 lb., 45 lb., 56 lb., 60 lb., 70 lb., 80 lb., 85 lb., 90 lb., 100 lb.

Fastenings, New Bolts, Nuts and Spikes. New Frogs, Switches, Crossings and all accessories. Carload and less carload inquiries and orders a specialty. Rails cut to lengths for structural purposes. Attractive prices. Immediate shipments from stock.

L. B. FOSTER COMPANY
Park Bldg., Pittsburgh, Pa.

WE OWN AND OFFER FOR SALE

A Real Bargain

Used McKeen Motor Passenger Car

All steel construction in first-class condition. Seating capacity 71.

For further information write or wire

Hyman-Michaels Co., People's Gas Bldg., Chicago. Phone, Harrison 1100

RAILS

New—with angles

850 tons 100-lb.
750 tons 85-lb.
900 tons 90-lb.
50 tons 80-lb.

SWITCH TURNOUTS

8—70-lb. ASCE, and frog. Manganese.
1—60-lb. ARA-A 4½ L.H. Good as New.

RAIL BRACES

2000—70-lb. pressed steel. New.

SPIKES

600 kegs—9/16 x 5½ in. "Zelnicker Select." Used.
500 kegs—9/16 x 5 and 5½ in. New.

And Track Accessories of Every Kind
All for Prompt Shipment

ZELNICKER IN ST. LOUIS

Get Bulletin 250—A Big Money Saver

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car.
Collier, Inc., Barron G.

Air Pressure Relays
Philadelphia Electric Company Supply Department

Air Rectifiers.
Holden & White, Inc.

Anchors, Guy.
Electric Service Supplies Co.
Holden & White, Inc.
Johns-Manville Co., H. W.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Automobiles and Buses.
Brill Co., The J. G.
White Co.

Axle Straighteners.
Columbia M. W. & M. I. Co.

Axles.
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
National Railway Appliance Co.
St. Louis Car Co.
Standard Steel Truck Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.

Babbiting Devices.
Columbia M. W. & M. I. Co.

Badges and Buttons.
American Railway Supply Co.
Electric Service Supplies Co.
International Register Co., The
Western Electric Co.

Bankers and Brokers.
Coal & Iron National Bank.

Batteries, Dry.
Chloride Electrical Storage Battery Co.
Johns-Manville Co., H. W.
Nichols-Lintern Co.
Western Electric Co.

Batteries, Storage
Electric Storage Battery Co.
Western Electric Co.

Bearings and Bearing Metals.
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Kerschner Co., Inc., W. R.
More-Jones Brass & M. Co.
St. Louis Car Co.
Taylor Elec. Truck Co.
Westinghouse Elec. & M. Co

Bearings, Center and Roller Side.
Holden & White, Inc.

Bearings, Oil-less, Graphite, Bronze and Wood.
Bound Brook Oil-less Bearing Co.

Bearings, Roller and Ball.
Railway Roller Bearing Co.

Bells and Gongs.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

St. Louis Car Co.
Western Electric Co.

Benders, Rail.
Niles-Bement-Pond Co.
Watson-Stillman Co.
Western Electric Co.
Zelnicker Supply Company, Inc., Walter A.

Boiler Cleaning Compounds.
Johns-Manville Co., H. W.

Boiler Coverings.
Johns-Manville Co., H. W.

Boiler Tubes.
National Tube Co.

Boilers.
Babcock & Wilcox Co

Bond Testers.
American Steel & Wire Co.
Lincoln Bonding Co

Bonding Apparatus.
Imperial Brass Mfg Co
Lincoln Bonding Co
Ohio Brass Co.

Bonding Tools.
American Steel & Wire Co.
Electric Service Supplies Co.
Electrical Materials Co.
Ohio Brass Co.

Bonds, Rail.
American Steel & Wire Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Lincoln Bonding Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Book Publishers.
McGraw-Hill Book Co.

Boring Tools, Car Wheel.
Niles-Bement-Pond Co.

Brackets and Cross Arms. (See also Poles, Ties, Posts, Piling and Lumber.)
Bates Expanded Steel Truss Co.
Creaghead Engrg. Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Hubbard & Co.
Lindsley Bros. Co.
Ohio Brass Co.
Western Electric Co.

Brake Adjusters.
Holden & White, Inc.
Westinghouse Trac. Brake Co.

Brake Shoes.
American Brake S. & Fdy. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.
Taylor Elec. Truck Co.
Wheel Truing Brakeshoe Co.

Brakes, Brake Systems and Brake Parts.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Holden & White, Inc.
National Brake Co.
St. Louis Car Co.
Safety Car Devices Co.
Taylor Elec. Truck Co.
Westinghouse Trac. Brake Co.

Brooms, Track, Steel or Rattan.
Paxson Co., J. W.
Western Electric Co.
Zelnicker Supply Company, Inc., Walter A.

Brushes, Carbon.
General Electric Co.
Jeandron, W. J.
Morgan Crucible Co.
United States Graphite Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Brushes.
Whiting-Adams Co.

Brushes, Graphite.
United States Graphite Co.

Brush Holders.
Anderson Mfg. Co., A. & J. M.
Eureka Co.

Bushings, Case Hardened Manganese.
Bemis Car Truck Co.

Bushings, Graphite and Wooden.
Bound Brook Oil-less Bearing Co.

Cable End Bells
Philadelphia Electric Company Supply Department

Cars, Dump
Differential Car Co.

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc., see those Headings.)

Car Trimmings. (For Curtains, Doors, Seats, etc., see those Headings.)

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
Thomas, Perley A.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand.
Electric Equipment Co.
Ellcon Co.

Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co.

Castings, Brass, Composition or Copper.
Anderson M. Co., A. & J. M.
American Steel Foundries.
Columbia M. W. & M. I. Co.
Eureka Co.
More-Jones Brass & M. Co.

Castings, Gray Iron and Steel.
American B. S. & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.
Standard Steel Works Co.

Castings, Malleable and Brass.
American Brake S. & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Catchers and Retrievers, Trolley.
Earle, C. I.
Electric Service Supplies Co.
Holden & White, Inc.
Ohio Brass Co.
Trolley Supply Co.
Wood Co., C. N.

Ceiling, Car
Pantasote Co.

Checks, Employees.
American Railway Supply Co.

Circuit Breakers.
Cutter Co., The.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Clamps and Connectors, for Wires and Cables.
Anderson Mfg. Co., A. & J. M.
Electric Railway Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Clamps, Insulator
Philadelphia Electric Company Supply Department

Cleaners & Scrapers, Track. (See also Snow-Plows, Sweepers and Brooms.)
Brill Co., The J. G.
Ohio Brass Co.
Western Electric Co.

Cleat Type Switchboard
Philadelphia Electric Company Supply Department .

Clusters & Sockets.
General Electric Co.

Coal and Ash Handling. (See Conveying and Hoisting Machinery.)

Coil Banding and Winding Machines.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Coils, Armature and Field.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Independent Lamp & Wire Co. .
King-Coil Mfg Co.
Westinghouse Elec. & Mfg. Co.

Coils, Choke & Kicking.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines.
Electric Service Supplies Co.
International Register Co.
Johnson Fare Box Co

Commutator Slotters.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co
Wood Co., C. N.

Commutator Truing Devices.
General Electric Co.

Commutators or Parts.
Cameron Elec'l Mfg. Co.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
King Coil Mfg. Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Compressors, Air.
General Electric Co.
Westinghouse Traction Brake Co.

Condensers.
General Electric Co.
Westinghouse Elec. & M. Co.

Conduits
Western Electric Co.

Conduits, Underground.
Johns-Manville Co., H. W.
Standard Underground Cable Co

Connectors, Solderless.
Dossert & Co.
Westinghouse Elec. & Mfg. Co

Controller Regulators.
Electric Service Supplies Co

Controllers or Parts
Columbia M. W. & M. I. Co.
General Electric Co.
Johns-Manville Co., H. W.
Westinghouse Elec. & M. Co.

Controlling Systems.
General Electric Co.
Westinghouse Elec. & M. Co.

Converters, Rotary.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Conveying and Hoisting Machinery.
Columbia M. W. & M. I. Co.
Green Eng'g Co.

Conveyors, Belt
Portable Machinery Co.

Conveyors, Coal and Ash
Portable Machinery Co.

Conveyors, Portable
Portable Machinery Co.

Cord, Bell, Trolley, Register, Etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The.
Roebling's Sons Co., John A.
Samson Cordage Works.
Trolley Supply Co.

Cord Connectors and Couplers.
Electric Service Supplies Co.
Samson Cordage Works.
Wood Co., C. N.

Couplers, Car.
Brill Co., The J. G.
Ohio Brass Co.
Van Dorn Coupler Co.
Westinghouse Trac. Brake Co.

Cranes. (See also Hoists.)
Toledo Bridge & Crane Co., The
Niles-Bement-Pond Co.

Creosoting. (See Wood Preservatives.)

Cross Arms. (See Brackets.)

Crossing Foundations.
International Steel Tie Co.

Crossing Signals. (See Signals, Crossing.)

Crossings, Track. (See Track, Special Work.)

Culverts.
Canton Culvert & Silo Co.

Curtains and Curtain Fixtures.
Brill Co., The J. G.
Electric Service Supplies Co.
Pantasote Co.
St. Louis Car Co.

Cutting Apparatus, Oxy-Acetylene.
Imperial Brass Mfg. Co.

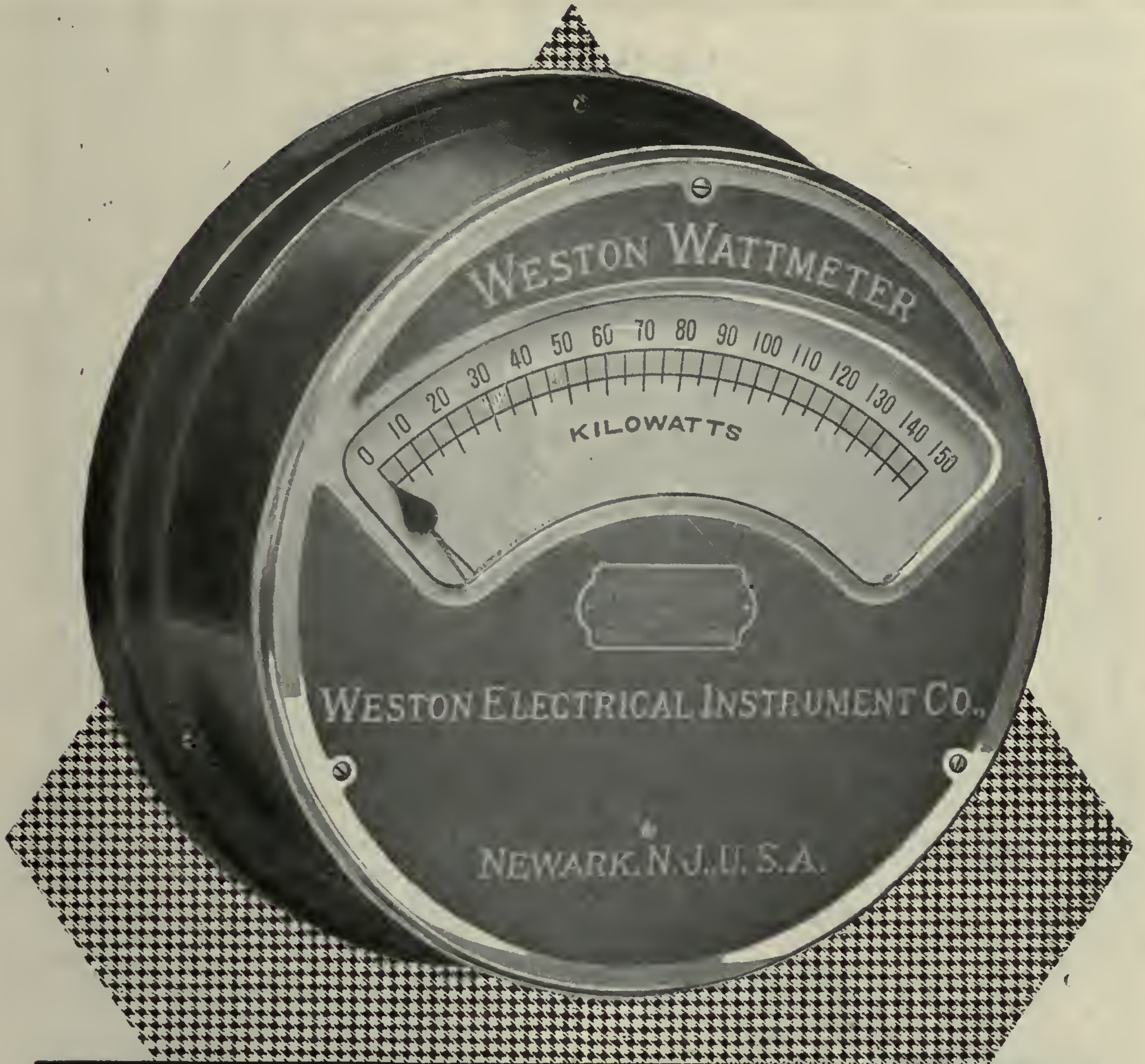
Derailing Devices.
Cleveland Frog & Crossing Co

Destination Signs.
Columbia M. W. & M. I. Co.
Creaghead Engrg. Co.
Electric Service Supplies Co.
Western Electric Co.

Detective Service.
Wish Service, P. Edward

Disconnecting Switches
Philadelphia Electric Company Supply Department

Dispatching Systems
Western Electric Co.



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Dogs, Lathe.
Williams & Co., J. H.

Door Operating Devices.
Consolidated Car Heating Co.
National Pneumatic Co., Inc.
Safety Car Devices Co.

Doors, Asbestos
Johns Manville Co., H. W.

Doors and Door Fixtures.
Brill Co., The J. G.
Hale & Kilburn Corp.

Doors, Folding Vestibule.
National Pneumatic Co., Inc.

Doors for Bus & Switch Compartment
Philadelphia Electric Company Supply Department

Draft Rigging. (See Couplers, Car.)

Drills, Track.
American Steel & Wire Co.
Electric Service Supplies Co.
Long Co., E. G.
Niles-Bement-Pond Co.
Ohio Brass Co.

Dryers, Sand.
Electric Service Supplies Co.
Zelnicker Supply Co., Inc., W. A.

Electrical Wires and Cables
Roebling's Sons Co., J. A.

Engineers, Consulting, Contracting and Operating.
Archbold-Brady Co.
Arnold Co., The.
Beeler, John A.
Byllesby & Co., H. M.
Drum & Co., A. L.
Ford, Bacon & Davis.
Republic Engineers Inc.
Richey, Albert S.
Sanderson & Porter.
Sargent & Lundy.
Scofield Engineering Co.
Sloan, Huddle, Feustel & Freeman
Stone & Webster.
White Companies, The J. G.
Woodmansee & Davidson Engineering Co.

Engines, Gas and Oil.
Westinghouse Elec. & M. Co.

Engines, Steam.
Westinghouse Elec. & M. Co.

Fare Boxes.
Brill Co., The J. G.
Cleveland Fare Box Co.
International Register Co. The
Johnson Fare Box Co
National Railway Appliance Co.
Ohmer Fare Register Co.

Fences, Woven Wire and Fence Posts
American Steel & Wire Co.
Page Steel & Wire Co.

Fenders and Wheel Guards.
Brill Co., The J. G.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Electric Service Supplies Co.
Root Spring Scraper Co.
Star Brass Works.
Trolley Supply Co.
Western Electric Co.
Wood Co., Charles N.

Fibre and Fibre Tubing.
Johns-Manville Co., H. W.
Westinghouse Elec. & M. Co.

Field Coils. (See Coils.)

Filters, Water.
Scaife & Sons Co., Wm. B.

Fire-Extinguishing Apparatus.
Johns-Manville Co., H. W.

Fire-Extinguishing Liquid.
J. M. Castle Co.

Fire-Proofing Materials.
Johns Manville Co., H. W.

Floodlights.
Crouse-Hinds Co.
Electric Service Supplies Co.

Flooring, Composition.
American Mason Safety T. Co.
Johns Manville Co., H. W.
Western Electric Co.

Forgings.
Columbia M. W. & M. I. Co.
Eureka Co.
Standard Steel Works Co.

Fuses and Fuse Boxes.
Chicago Fuse Mfg. Co
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Johns-Manville Co., H. W.
Western Electric Co
Westinghouse Elec. & M. Co
Williams & Co., J. H.

Fuses, Refillable.
Columbia M. W. & M. I. Co.
Economy Fuse & Mfg. Co.
General Electric Co.

Gages, Oil and Water.
Ohio Brass Co.

Gaskets.
Johns-Manville Co., H. W.
Power Specialty Co.
Westinghouse Trac. Brake Co.

Gas-Electric Cars.
General Electric Co.

Gas Producers.
Westinghouse Elec. & M. Co.

Gates, Car.
Brill Co., The J. G.

Gear Blanks.
Carnegie Steel Co
Standard Steel Wks. Co.

Gear Cases.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Westinghouse Elec. & M. Co.

Gears and Pinions.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
National Ry. Appliance Co.
Nuttall Co., R. D.

Generating Sets, Gas-Electric.
General Electric Co.

Generators.
Dick, Kerr & Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Gongs. (See Bells and Gongs.)

Graphite.
Morgan Crucible Co.

Grates, Chain.
Green Eng'g Co.

Greases. (See Lubricants.)

Grinding Blocks & Wheels
Railway Track-work Co.

Grinders and Grinding Supplies.
Metal & Thermit Corp
Railway Track-work Co.
Western Electric Co.

Grounding Boxes
Philadelphia Electric Company Supply Department

Guards, Trolley.
Electric Service Supplies Co.
Ohio Brass Co.

Harps, Trolley.
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
Hensley Trolley & Mfg. Co.
Holland Trolley Supply Co.
More-Jones Brass & M. Co.
Nuttall Co., R. D.
Star Brass Works.
Western Electric Co.

Headlights.
Crouse-Hinds Co.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.
Trolley Supply Co.

Headlining.
Pantasote Co.

Heaters, Car, Electric.
Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
Smith Heater Co., Peter.

Heaters, Car, Hot Air and Water.
Cooper Heater Co.
Smith Heater Co., Peter.

Heaters, Car, Stove.
Electric Service Supplies Co.
Smith Heater Co., Peter.

Hoists and Lifts.
Columbia M. W. & M. I. Co.
Duff Manufacturing Co.
Ford Chain Block & Mfg. Co.
Niles-Bement-Pond Co.
Toledo Bridge & Crane Co., The
Yale & Towne Mfg. Co.

Holders, Tool.
Williams & Co., J. H.

Hose Bridges.
Ohio Brass Co.

Hose, Pneumatic & Fire
Johns Manville Co., H. W.

Hydraulic Machinery.
Niles Bement-Pond Co.
Watson-Stillman Co.

Inspection.
Elec'l Testing Laboratories.

Instrument Cut-out Boxes
Philadelphia Electric Company Supply Department

Instruments, Measuring, Testing and Recording.
Economy Electric Devices Co.
General Electric Co
Johns-Manville Co., H. W.
Western Electric Co.
Westinghouse Elec. & M. Co.
Weston Elec'l Instrument Co.

Insulating Cloths, Paper and Tape.
Anchor Webbing Co.
General Electric Co.
Hope Webbing Co.
Irvington Varnish & Insulator Co.
Johns-Manville Co., H. W.
Mitchell-Rand Mfg. Co.
Okonite Co.
Standard Underground Cable Co.
Standard Woven Fabric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Insulation. (See also Paints.)
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Mitchell-Rand Mfg. Co.
Okonite Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Insulators. (See also Line Material.)
Anderson M. Co., A. & J. M.
Creaghead Engrg. Co.
Drew Elec. & Mfg. Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Macallen Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Insulator Pins.
Electric Service Supplies Co.
Hubbard & Co.

Insurance, Fire
Marsh & McLennan.

Inventions, Developed and Perfected.
Peters & Co., G. D.

Jacks. (See also Cranes, Hoists and Lifts.)
Brill Co., The J. G.
Buckeyey Jack Mfg. Co.
Columbia M. W. & I. Co.
Duff Manufacturing Co.
National Ry. Appliance Co., Ltd.
Templeton Kenly & Co., Ltd.
Watson-Stillman Co.

Joints, Rail.
Carnegie Steel Co.
Lackawanna Steel Co.
Rail Joint Co.
Zelnicker Supply Co., Inc., W. A.

Journal Boxes.
Bemis Car Truck Co.
Brill Co., The J. G.
Gurney Ball Bearing Co.
Railway Roller Bearing Co.

Junction Boxes.
Johns-Manville Co., H. W.
Standard Underground Cable Co.

Laboratories.
Elec'l Testing Laboratories.

Lamp Guards and Fixtures.
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Lamps, Arc and Incandescent.
Anderson M. Co., A. & J. M.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Lamps, Signal and Marker.
Nichols-Lintern Co.
Ohio Brass Co.

Lathes, Attachments.
Williams & Co., J. H.

Lathes, Car Wheel.
Niles-Bement-Pond Co.

Lighting Regulators, Car.
Holden & White, Inc.

Lightning Protection.
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Line Material. (See also Brackets, Insulators, Wires, etc.)
Anderson M. Co., A. & J. M.
Archbold-Brady Co.
Columbia M. W. & M. I. Co.
Creaghead Engrg. Co.
Dick, Kerr & Co.
Drew Elec. & Mfg. Co.
Electric Railway Equipment Co
Electric Service Supplies Co.
Eureka Co.
General Electric Co.
Holden & White, Inc.
Hubbard & Co.
Johns-Manville Co., H. W.
Macallen Co.
More-Jones Brass & M. Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Liquid, Fire-Extinguishing
J. M. Castle Co.

Locks.
Yale & Towne Mfg. Co.

Locomotives, Electric.
Brill Co., The J. G.
General Electric Co.
McGuire-Cummings Mfg. Co.
Westinghouse Elec. & M. Co.

Lubricating Engineers.
Galena-Signal Oil Co.

Lubricants, Oil and Grease.
Borne, Scrymser Co.
Galena-Signal Oil Co.

Lumber. (See Poles, Ties, Posts etc.)

Machine Work.
Columbia M. W. & M. I. Co.
Holden & White, Inc.

Machine Tools.
Columbia M. W. & M. I. Co.
Niles-Bement-Pond Co.
Watson-Stillman Co.

Manganese Parts.
Bemis Car Truck Co.

Mats.
Johns-Manville Co., H. W.

Meters, Car, Watthour.
Economy Electric Devices Co.

Meters (See Instruments.)

Mica.
Macallen Co.
Mechanical Rubber Co.

Mirrors for Motormen.
Drew Elec. & Mfg. Co.

Motormen's Seats.
Electric Service Supplies Co.
Wood Co., C. N.

Motor Generator, Bonding and Welding.
Lincoln Bonding Co.

Motors and Generators Sets
General Electric Co.

Motors, Electric.
Dick, Kerr & Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Nuts and Bolts.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Hubbard & Co.
Lackawanna Steel Co.

Oil Storage Systems
Gilbert & Barber Mfg. Co.

Oils. (See Lubricants.)

Overhead Equipment. (See Line Material.)

Oxy-Acetylene. (See Cutting Apparatus, Oxy-Acetylene.)

Packing.
Johns-Manville Co., H. W.
Power Specialty Co.
Westinghouse Trac. Brake Co.

Packing Rings.
Johns-Manville Co., H. W.

Paints and Varnishes. (Insulating.)
Holden & White, Inc.
Irvington Varnish & Insulator Co.
Johns-Manville Co., H. W.
Mitchell-Rand Mfg. Co.

Paints and Varnishes. (Preservative.)
Johns-Manville Co., H. W.

Paints and Varnishes for Woodwork.
National Railway Appliance Co

Paving Material.
American B. S. & Fdry. Co.

Pickups. (Trolley Wire.)
Electric Service Supplies Co.
Ohio Brass Co.

Pinion Pullers.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Wood Co., C. N.

Pinions. (See Gears.)

Pins, Case Hardened, Wood and Iron.
Bemis Car Truck Co.
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Trac. Brake Co.

Pipe.
National Tube Co.

Pipe Fittings.
Power Specialty Co.
Standard Steel Works Co.
Watson-Stillman Co.
Westinghouse Trac. Brake Co.

Pliers, Insulated.
Electric Service Supplies Co.
National Railway Appliance Co.

Pneumatic Hose.
Westinghouse Trac. Brake Co.

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  - Bates Expanded Steel Truss Co.
  - Electric Railway Equipment Co.
  - Hubbard & Co.
  - National Railway Appliance Co.
- **Pole Sleeves.**
  - Drew Elec. & Mfg. Co.
- **Poles, Ties, Posts, Piling and Lumber.**
  - Lindsley Bros. Co.
  - Valentine-Clark Co.
  - Western Electric Co.
  - White Marble Lime Co.
- **Poles and Ties, Treated.**
  - Lindsley Bros.
  - Valentine-Clark Co.
  - Western Electric Co.
- **Poles, Trolley.**
  - Anderson M. Co., A. & J. M.
  - Columbia M. W. & M. I. Co.
  - Electric Service Supplies Co.
  - Holland Trolley Supply Co.
  - National Tube Co.
  - Nuttall Co., R. D.
- **Pole Reinforcing.**
  - Hubbard & Co.
- **Poles, Tubular Steel.**
  - Electric Railway Equipment Co.
  - National Tube Co.
- **Porcelain Bushings**
  - Philadelphia Electric Company Supply Department
- **Post-Type Insulators**
  - Philadelphia Electric Company Supply Department
- **Potheads**
  - Philadelphia Electric Company Supply Department
- **Power Saving Devices.**
  - Arthur Power-Saving Recorder Co.
- **Pressure Regulators.**
  - General Electric Co.
  - Ohio Brass Co.
  - Westinghouse Trac. Brake Co.
- **Protective Devices**
  - Philadelphia Electric Company Supply Department
- **Pumps.**
  - Watson-Stillman Co.
- **Punches, Ticket.**
  - American Railway Supply Co.
  - Bonney-Vehslage Tool Co.
  - International Register Co., The
  - Wood Co., C. N.
- **Punching Machinery.**
  - Watson-Stillman Co.
- **Purifiers, Feed Water.**
  - Scaife & Sons Co., Wm. B.
- **Rail Grinders. (See Grinders.)**
- **Rails, Relaying.**
  - Zelnicker Supply Company, Inc., Walter A.
- **Rail Welding. (See Welding Processes and Apparatus.)**
- **Rattan.**
  - Brill Co., The J. G.
  - Electric Service Supplies Co.
  - Hale & Kilburn Corp.
  - McGuire-Cummings Mfg. Co
  - St. Louis Car Co.
- **Recorders, Power Saving.**
  - Arthur Power-Saving Recorder Co.
- **Registers and Fittings.**
  - Bonham Recorder Co.
  - Brill Co., The J. G.
  - Electric Service Supplies Co.
  - International Register Co., The
  - Ohmer Fare Register Co.
  - Rooke Automatic Register Co.
- **Reinforcing Concrete.**
  - American Steel & Wire Co.
- **Repair Shop Appliances. (See also Coil Banding and Winding Machines.)**
  - Columbia M. W. & M. I. Co.
  - Electric Service Supplies Co.
- **Repair Work. (See also Coils, Armature and Field.)**
  - Cleveland Armature Works.
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
  - Independent Lamp & W. Co.
  - King Coil Mfg. Co.
  - Westinghouse Elec. & M. Co.
- **Replacers, Car.**
  - Columbia M. W. & M. I. Co.
  - Electric Service Supplies Co.
- **Resistance, Grid.**
  - Columbia M. W. & M. I. Co.
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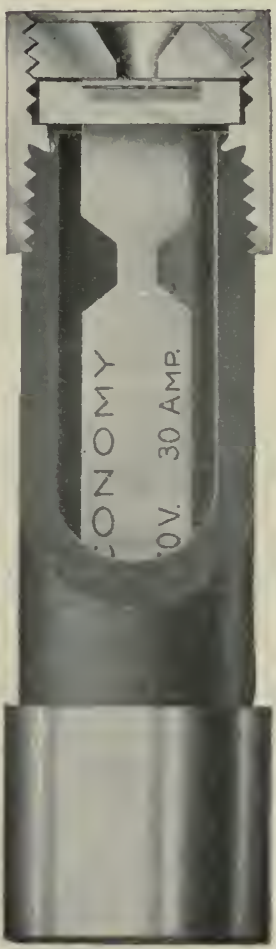

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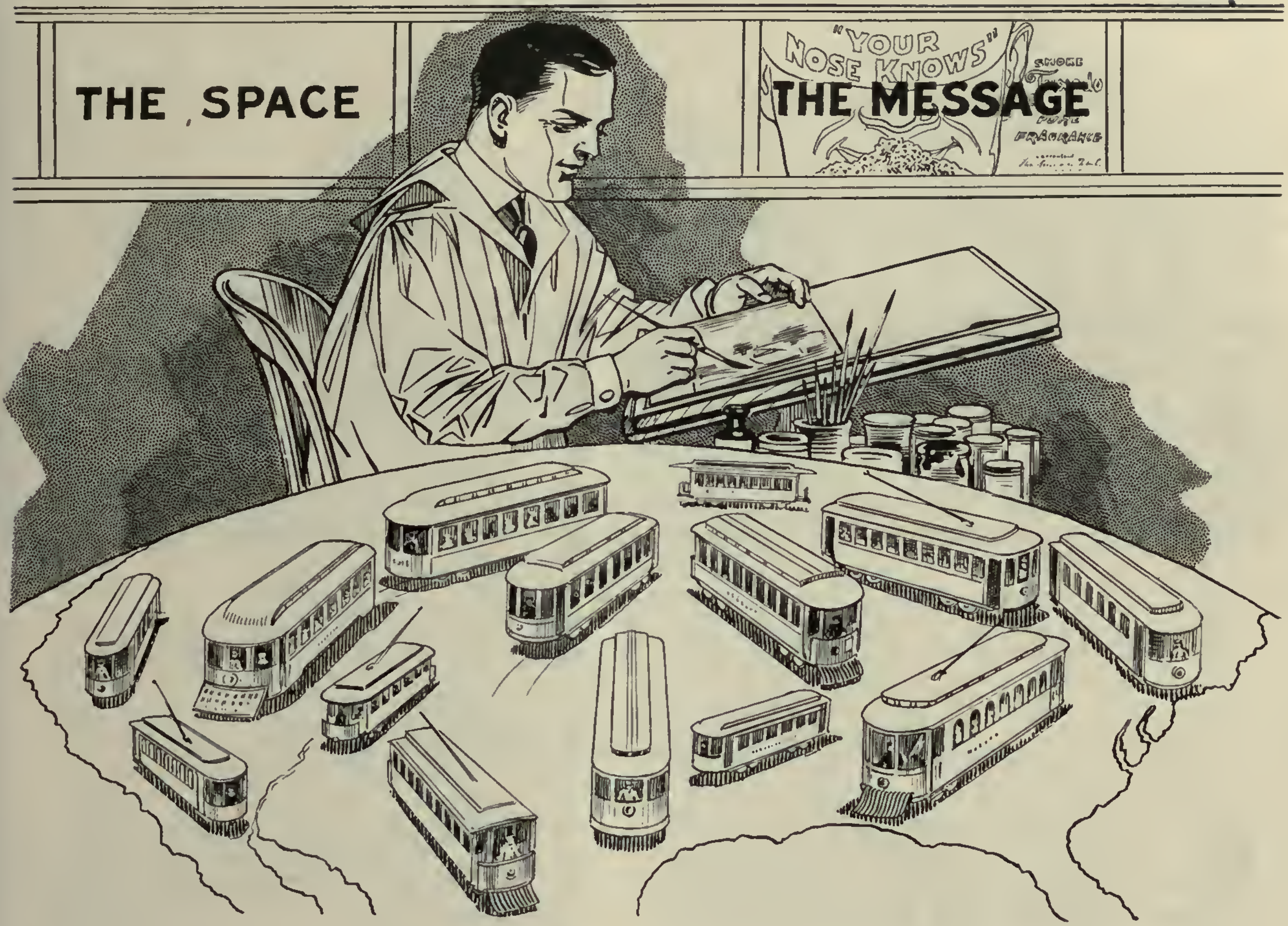

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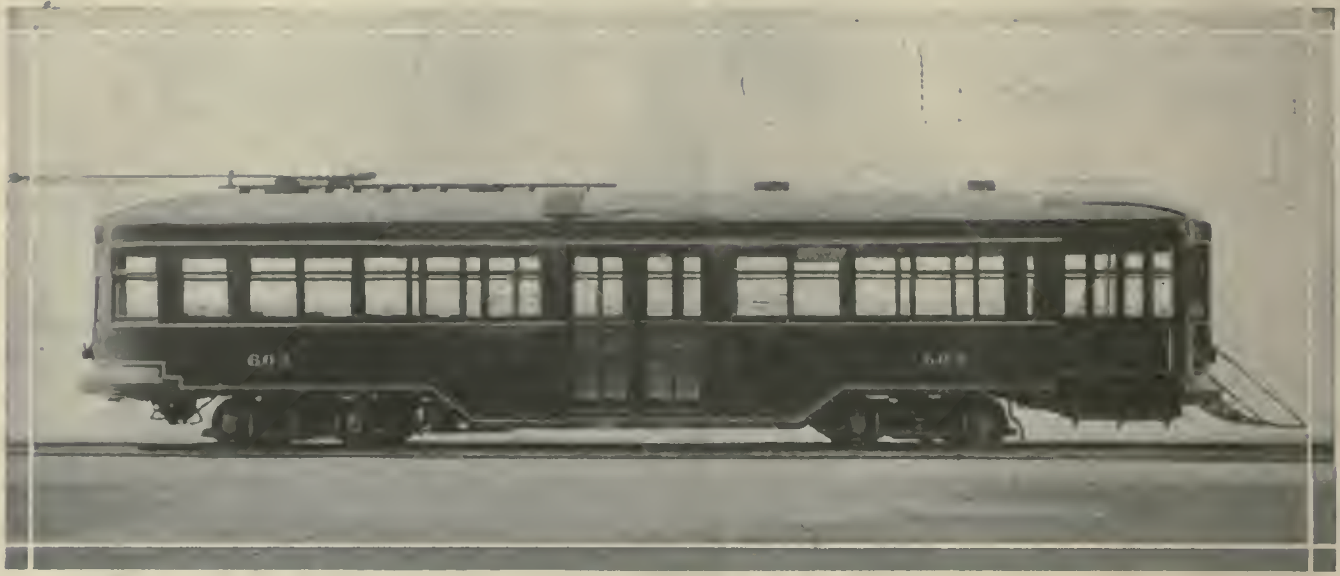

Front-Entrance, Center-Exit Cars Speed Up Schedules

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As, of course, every manager is perfectly well aware of this, it may be assumed that every car ever designed has been intended to be "the right car."

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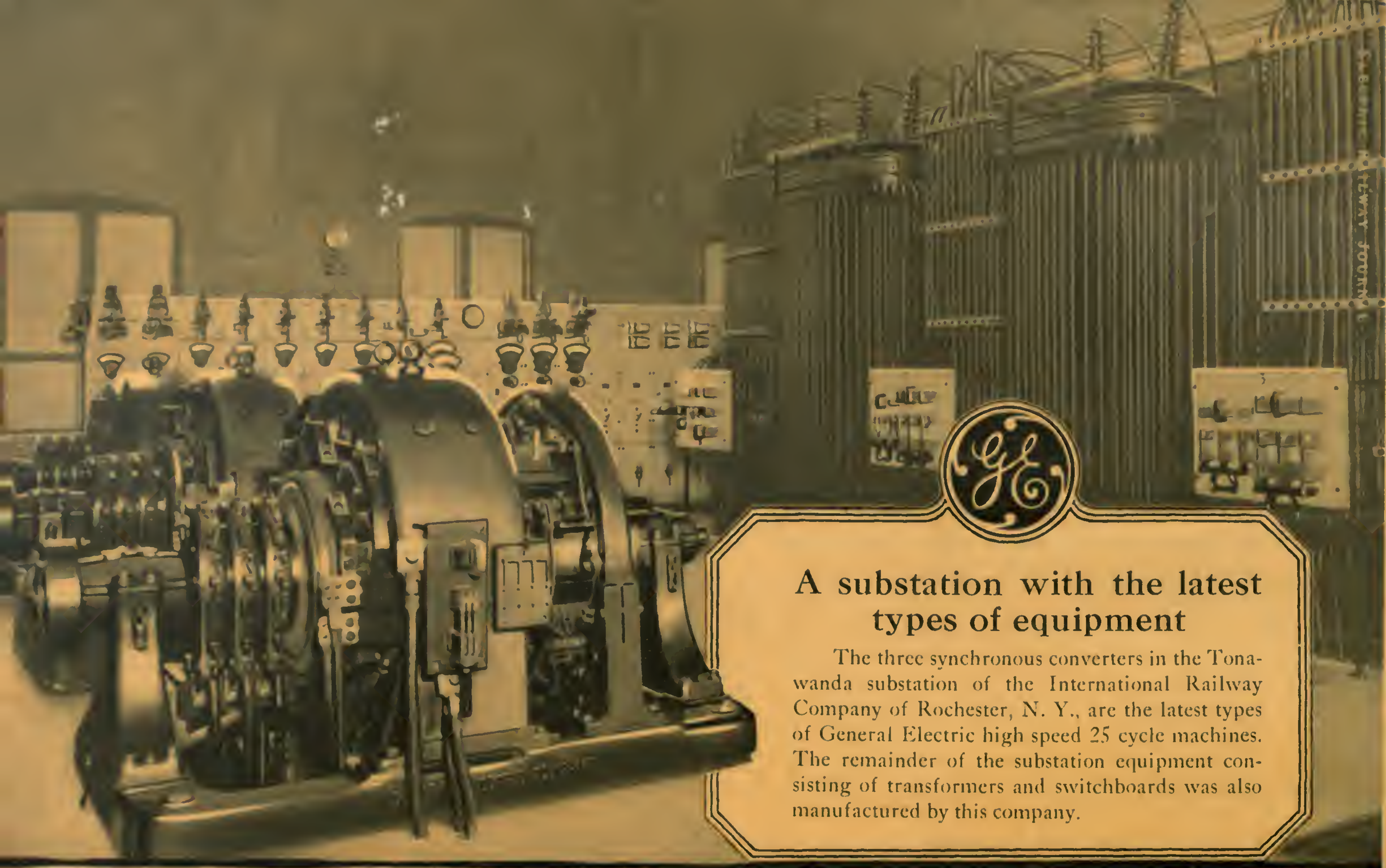

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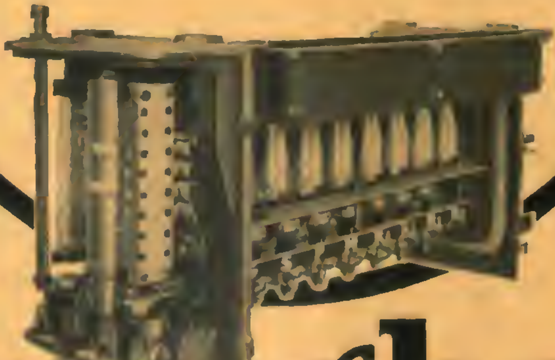

Westinghouse

Vol. 53, *No* 6 New York, February 8, 1919 ***Pages*** **263** ***to*** **304**

Electric Railway Journal

H. W. BLAKE, ***Editor***

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Our nearest district office will furnish samples on request. Described on page 794 of Westinghouse Annual Catalogue of Electrical Supplies, dated January, 1919.

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Population served 37,000

THAT even in a small city with many private automobiles the street railway can live and grow—*if cars and service are right*—is proved by the experience of Bellingham.

The Safety Car Service not only boomed the traffic on the pioneer York Addition-Court House Line the first year, but has continued to boom it so well that in May, 1918, this line carried 50 per cent. more riders than in May, 1917—and at less expense.

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PITTSBURGH
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O-B Type D Splicer—20 inches long—Patented

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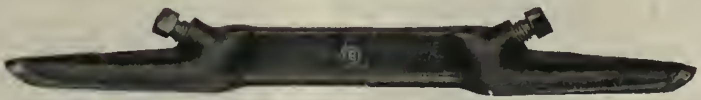
O-B Type C Splicer—20 inches long—Patented

Saves the wire. The straightaway entrance of the trolley wire does away with crystallization. The easy, smooth wheel approach minimizes arcing. Very popular in city service. Much used to keep badly worn wire in service. (Type CM is similar but 11 inches long and intended for lighter duty.)

O-B Clark Splicing Ear—15 inches long—Patented



O-B Clark Splicer—15 inches long—Patented

This is a well-known standard, successful under ordinary conditions. It embodies some exclusive O-B features.

O-B Clark Splicer—10 inches long—Patented

A light splicer which serves successfully on outlying lines.

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Obliterates the Rail Joint

Finished Thermit fully welded Insert Rail Joint

Thermit Insert Welds 4 Years Under Heavy Traffic — No Breaks —

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Making up special work. Welding compromise joints. Repairing broken motor cases and car truck frames. Rendering the Electric Railways independent of any shortage of new steel products.

Four years ago all rail joints on the Third Avenue Railway System were *obliterated* by the Thermit Insert Weld Process.

Since then—in spite of continuously heavy traffic—in spite of the terribly severe winter of 1917-18 with its months of zero weather—no breaks have occurred.

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Ten Reasons for International Steel Twin Ties

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2—**Support.** They give adequate support to the joint.

3—**Foundation.** They afford better pavement foundation.

4—**Work.** They require less excavation and less foundation material.

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6—**Alignment.** They afford a true self-aligning track, and hold the rail to perfect gage.

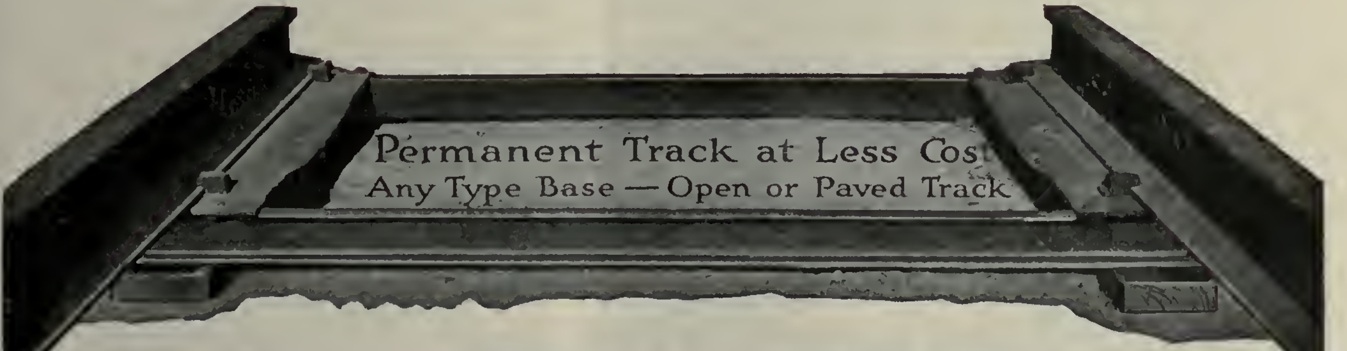
7—**Rail Wear.** They save your rail and rolling stock.

8—**Bearing.** The entire bearing area of the tie is brought under the rail where it belongs.

9—**Material.** Only ⅓ as many ties are required for a given piece of work, with a proportionate economy in labor.

10—**Cost.** Track laid with Steel Twin Ties costs less than any other type.

If you are not satisfied that Steel Twin Ties make a very profitable investment for any Street Railway, write us at once


Permanent Track at Less Cost
Any Type Base — Open or Paved Track

The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

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Phono-Electric

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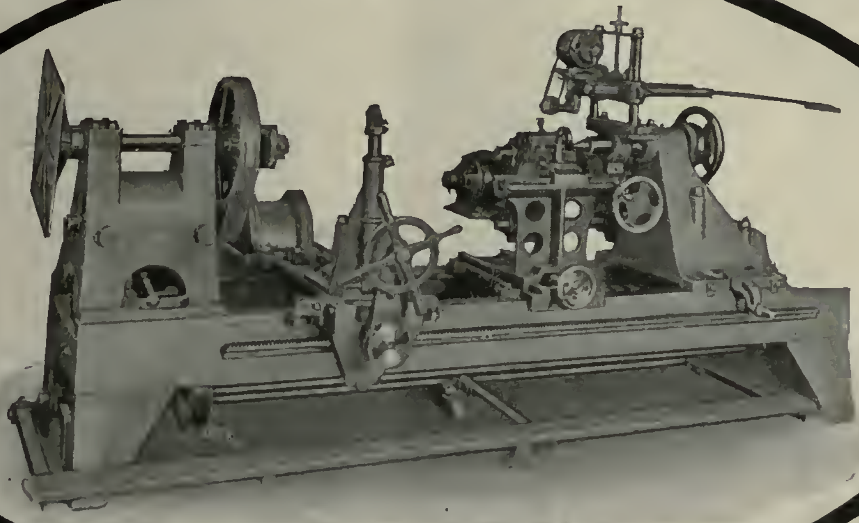
"The Wearing Qualities of the Contact Wire Indicate That Replacement Will not be Necessary for Twenty or Twenty-Five Years."

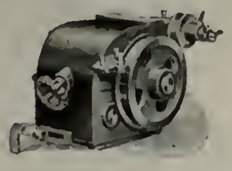
Bridgeport Brass Company

Bridgeport Connecticut

2140

PEERLESS TOOLS





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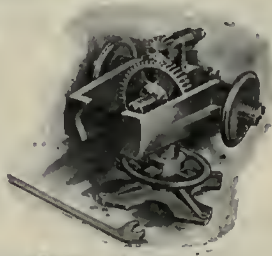

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Practically every armature repair can be made on the heavy duty Peerless machine, illustrated above. It consists of a banding machine, commutator slotting and commutator grinding machine and field coil winding plate. It saves time, labor and does better work than primitive methods.

The complete Peerless line also includes smaller tools for in cases where the different operations are to be carried on separately. For example—

(1) See illustrations. This is an Armature Band Wire Tension Machine which is light and portable. It maintains the desired tension on the banding wire when in use.

(2) A Commutator Slotting Machine, portable and complete with motor.

(3) Type A Armature Winding Stand, adjustable in height and to suit armatures of various lengths.

(4) Type B Armature Winding Stands occupy a minimum of space and therefore the least hindrance to the operator.

(5) Armature Truck, Type F, is indispensable for moving and wheeling armatures.

(6) Pinion Pulling Machine that pulls pinions *easily* and *rapidly*.

Write for bulletin on Peerless Tools.

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BETTER TRACKS
at Less Cost

Can Be Laid

by using
D.M. Ties all
the way!

Permanent—
Resilient—
Economical

Are the Result

of careful
construction.

And the best and most careful method known so far is that of using D.M. Ties.

And these Ties have **Made Good** with a vengeance.

Dayton Mechanical Railway Ties are not only a **theoretical** solution of track troubles. They are the **practical** outcome of years of work and tests on track carrying both city and heavy, high-speed, interurban cars.

Write for full particulars.

THE DAYTON MECHANICAL TIE CO.
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If you want a *permanent* culvert,

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——a culvert that, if it does freeze up in winter, will freeze without cracking and be on the job when the spring thaw comes,

——a culvert that being resilient, not rigid, adjusts itself without damage to the heaving and settling of the ground,

——a culvert that resists the corrosive action of salts and acids present in all soils,

AMERICAN ARMCO INGOT IRON

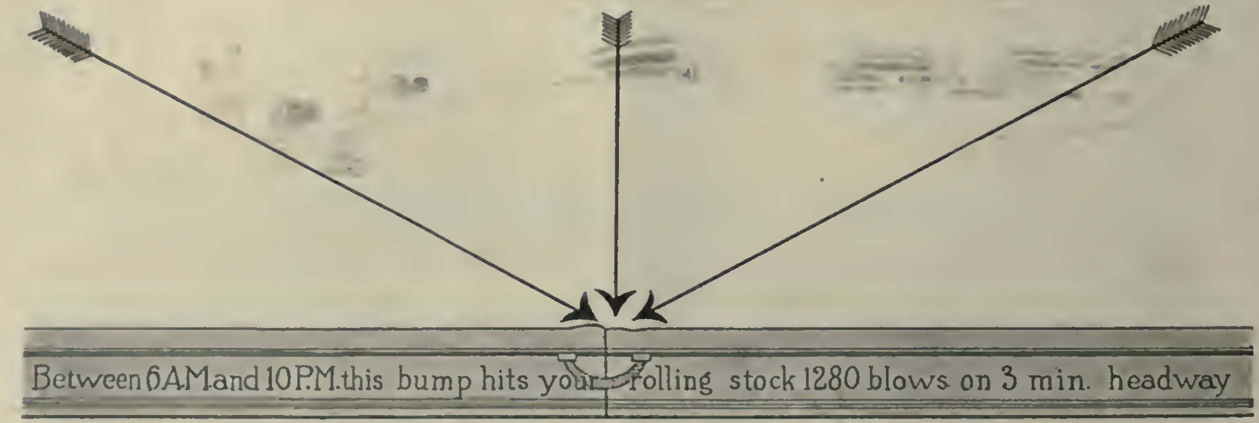
then specify

"ARMCO" IRON CULVERTS

For that's the kind of a culvert ARMCO is.

There is a manufacturer in nearly every state, and in Canada, making genuine rust-resisting ARMCO IRON CULVERTS and other products of ARMCO IRON, such as flumes, siphons, tanks, road signs, roofing, etc. Write for full information and nearest shipping point on products in which you are interested.

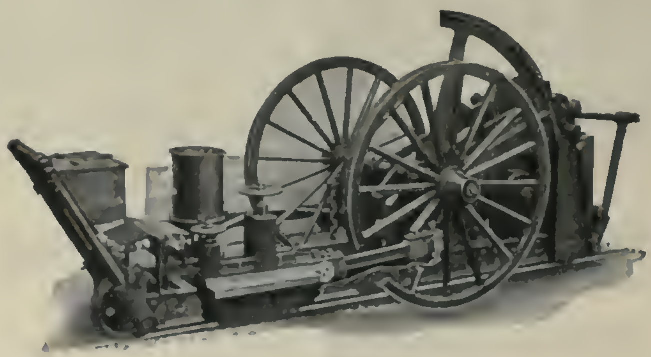
Armco Iron Culvert & Flume
Mfrs. Association
Transportation Bldg, Chicago


Between 6 A.M. and 10 P.M. this bump hits your rolling stock 1280 blows on 3 min. headway

—and it hits both ways.

It not only causes injury to car equipment. It is also likely to produce very serious damage to the track foundation.

A very slight inequality in the surface of a rail is a very small matter in appearance but its potentiality for damage is mighty big.



The Reciprocating Track Grinder

removes these inequalities quickly and economically and regardless of whether they are deep or shallow.

The reciprocating action makes the machine as simple to use as a carpenter's plane.

That permits of the use of ordinary unskilled labor in the operation of the machine and reduces to the lowest point the cost of keeping track in excellent condition.

More than a hundred railway companies throughout the world have found that a Reciprocating Grinder is a profitable investment. By far the great majority of these companies bought their first Reciprocating Grinder "on suspicion."

You can put one on your tracks on the same basis.

RAILWAY TRACK-WORK COMPANY

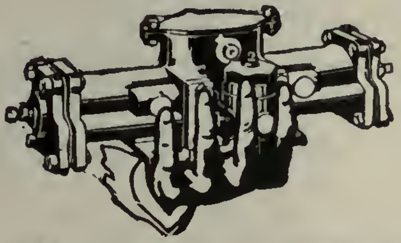
30th and Walnut Streets, Philadelphia

Use National Pneumatic Door and Step Control

To Convert Your Open or Gate Cars to the Standard Vestibuled Type

Applied to your present open bench cars, you eliminate running-board accidents.

Applied to your present gate cars, you eliminate platform accidents.



Applied to any kind of car, you eliminate the need for the manual labor so scarce and expensive today.

Prices and delivery dates are yours for the asking.

NATIONAL PNEUMATIC COMPANY INC.

NPC

50 Church St. New York

515 Laflin St. Chicago

Coming

The midyear meeting of the American Electric Railway Association to discuss the livest topics of the day—and the main theme will be

Rehabilitation

A big word
A big topic
A big promise

to the

Manufacturers

who sense the coming of the day when big orders will again be the rule.

Now is the time to carry the ideas that sell your products to the men who buy them.

Electric Railway Journal advertising pages are read regularly by the men who will say what their roads shall buy—now and when the big buying begins.

It is not too late to start *now*. When buying begins those who advertise regularly and prominently now will have the inside track.

On which track will you be?

Rates from $100 a page to $60 a page, according to amount of space used.

Electric Railway Journal

Member Audit Bureau of Circulations.

10th Avenue at 36th Street, New York

Midyear Meeting on March 14 •

THE midyear meeting and banquet of the American Electric Railway Association will be held in New York on Friday, March 14.

The technical sessions will be held in the Engineering Societies' Building, 29 West Thirty-ninth Street, beginning at 10 a. m. The program follows:

[1]

Report of Committee on Readjustment, P. H. Gadsden, Chairman.

[2]

The State of the Industry
- (a) Modern regulatory plans and theories, by an electric railway executive.
- (b) Capital and electric railways, by a banker.
- (c) From the regulatory viewpoint, by three active or former public utility commissioners.

The annual banquet will be held in the evening at the Waldorf-Astoria Hotel. The general topic of the addresses will be "Rehabilitation."

• Reprinted from editorial section Electric Railway Journal Feb. 1, 1919.

Supposed to be the oldest building in the U. S.—and to have been built in 1672 as Manor House and place of defense known as Fort Cralo. General Abercrombie's headquarters while marching to attack Fort Ticonderoga in 1758—where it is said that at the cantonment east of this house, near the old well, the Army Surgeon, R. Shuckburg, composed the popular song of Yankee Doodle.

The Old Post Road to Albany

FAMOUS all over the United States, loved by all followers of American antiquity—the Albany Post Road is probably the scene of more history than any other part of America.

This wonderful old road—which roughly follows the banks of the Hudson—was described in a "Publick Highways" Act of 1703, as a "Publick and Common General Highway to extend from King's Bridge in the County of Westchester, through the same County of Westchester, Dutchess County and the County of Albany—of the breadth of four rods—(English measurement) at the least—to be continuous and remain forever the Publick Common General Road and Highway from King's Bridge aforesaid to the ferry at Crawlier over against the City of Albany."

MANY and interesting are the sights along this worn old Road—planned back in the time of Queen Anne. Along this road the Dutch Settlement—the Indian Wars and the Revolutionary War—all played their important parts in the formation stages of these United States. Famous places are many—King's Bridge, which connects Manhattan with the mainland—New Amsterdam—of Dutch fame—the famous Spuyten Duyvel Hill—Dutch again as in Yonkers—derived from John-Kerr, a common name for the male heir to a Dutch family; and so on.

Every mile—every pace of the way is connected with some fascinating incident of Revolution and Pre-Revolution time which must be spared for another telling. Strange, little happenings, interesting in the way they affected the United States history and little known to the average man, will from time to time be given here.

Galena Oils

and their record

are also interesting to a degree—to every street railway man. Their staunch standing up under the most vigorous conditions—their complete fulfillment of every hope—backed by Galena Service—reflect the same ideal in which the Post Road was originated. Galena Service is "to be and remain forever" the best—most economical form of lubricant for the Electric Railway Industry.

Galena-Signal Oil Co.

Franklin, Pa.

Complete stocks of forged blanks guarantee prompt service for grade M users.

Grade M Gears Cost Less per Mile

When you buy gears, buy them on a service basis. You can not afford to pay more for a gear than its life in service warrants—cost per mile is the economical measure to use in buying such equipment.

Because Grade M gears are cheaper by the mile they have been adopted as standard by sixty-five electric railways in this country and abroad.

If you want your gearing to cost less by the year buy

Grade M

The More Miles-per-Dollar Gearing

General Electric Company

General Office Schenectady, N.Y.

40-41

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Volume 53 New York, Saturday, February 8, 1919 *Number* 6

The Electric Railway Is the Sick Man of Business

THUS aptly the electric railway is described in a recent application for higher fares by the San Diego (Cal.) Electric Railway. The disease, in the application, is described as being beyond the comprehension of the family doctor. Therefore, it has been necessary to consult a specialist to prescribe a remedy. In this case the specialist is the Railroad Commission of the State. There is nothing to indicate, according to the application, that the company is financially weak but it is incapable of continuing to maintain its normal strength at present, due to the lack of proper nourishment.

A rather extended abstract of the application is published in this issue because the situation described is typical of the entire industry and also because the ownership at San Diego has been in the same small group continuously since its organization, so that it has been possible easily to compile all facts in regard to its financial history. Here is a property representing an investment of approximately $6,000,000 which has made possible the development of a growing city, which has always given good service, has been conservatively capitalized and has introduced economies as they have been developed, like the skip stop and the one-man car. Nevertheless it finds itself now in a position where its income is insufficient to pay for additional bond interest and sinking fund requirements or to retire any part of its investment at the expiration of its present franchise. That these conditions are paralleled elsewhere indicates that they are of general, not local cause.

It has been well said that the industry is not suffering from any trouble which more money will not cure. With the diagnosis already made, there should be hope that the illness will not be of long duration and the invalid will soon be prepared again to do his necessary work in the affairs of the community.

Teamwork and Speed and Special Training Acquired Overseas

ONE of the greatest lessons which the American people have learned from the world war is the amazing speed with which apparently unsurmountable difficulties were overcome by proper organization. The training, discipline and equipment of an enormous army and the transport of this army overseas, together with the continuous supplies of ammunition, equipment and food that were necessary, are achievements which were not dreamed of before the war. This spirit of accomplishing large things by teamwork should do much toward increasing the co-operation desirable in revamping and restoring electric railway equipment which has lost some of its efficiency through deferred maintenance.

The men now returning from army service and entering railway service, particularly in shop work, should be of great assistance in fostering this spirit of doing things. They have learned to do by doing, and they have developed resourcefulness and judgment because they have had to exercise these characteristics to get themselves out of difficulties abroad. These men are returning with keen, alert minds, disciplined to act promptly and thoroughly as members of a team rather than as individuals.

Many of these men have become skilled in standard trades and have been trained in special work. Thus a machinist in the Ordnance Department would naturally be expected to be able to do welding and to maintain the electrical equipment of generators and motors, and many of the carpenters from overseas service have been required to do a large amount of bridge construction. In this way the instinct for industrial work has been developed, and the special training which these men have received should prove of assistance in electric railway maintenance work. Moreover, there has been a necessity for teamwork and speed, qualities which are very useful in a railway organization, just as they are in military campaigns.

The Safety Car Invades the East

THANKS to the United States Housing Corporation the Connecticut Company is the possessor of twenty one-man safety cars which will help relieve the traffic congestion in Bridgeport and elsewhere. Last Sunday, service with a number of these cars was inaugurated in Bridgeport and, as this issue of the paper goes to press, favorable reports have been received as to the reception of this service by the public. In arranging for this service some rerouting was done to give the cars a "fair show," and headways were cut down to such an extent as to furnish a demonstration of what safety-car service really is. The results obtained in Bridgeport will be helpful in many other places where better service is in contemplation, for the congested section of this city presents many obstacles to good transportation so that the conditions can be considered typical rather than ideal. Realizing the importance of the new service, both locally and in its relation to the general transportation problem, the management of the Connecticut Company spared no pains to safeguard the service from interruption. The crews were thoroughly trained and every incentive was given them to make a success of their new work.

The safety car is one of the few elements of the present electric railway situation which promise the considerable service improvement which is necessary for profitable operation. That this fact is appreciated is shown by the large proportion of cars of this type ordered in 1918. According to the statistics published in the issue of this paper for Jan. 4, 1919, more than one-third of the 1918 orders were for such cars. These orders were from properties scattered over a wide area. The experience to be gained with these cars during 1919 will be of great value and interest. Cars of this type have great inherent possibilities. The problem, after getting the cars, is to make the most of these possibilities. Careful adaptation to local requirements, increase in service to the full, development of a co-operative spirit in the employees, a well-planned and carefully executed publicity program and belief in the service-producing qualities of the cars will all conduce to success in this direction.

Service at Cost Versus Cost of Service

PRESIDENT R. W. PERKINS of the Shore Line Electric Railway of Connecticut recently made a very apt remark on the present electric railway situation. The occasion was the annual meeting on Jan. 25 of the Connecticut Editors' Association, at which addresses were made by several Connecticut electric railway executives. In his address Mr. Perkins said:

> You have all been reading a great deal about service at cost, as if it were something quite new and a sure cure for all the ills to which the street railway is subject.
>
> The service-at-cost principle is fully recognized in the Connecticut laws governing the street railways; every decision by the commission has been founded upon that principle, but the truth is that the law while granting to the public transportation at cost fails to guarantee to the corporation the cost of transportation, and just there regulation fails, for while it can and does protect the public against an exorbitant charge for service, it is powerless to put the corporation in possession of a revenue that shall, in turn, enable it to render the service the public demands.

The condition described in these remarks is very true. For the past fifteen years electric railways have been subject to all kinds of limiting legislation and regulation. Service has been specified by the authorities, transfers have been required, wages have been increased and all kinds of improvements have been ordered. The theory upon which this action has been based is that the oversight exercised and the changes ordered were in the interest of the public and so justified. That they may have been in the interest of the public is true, but the additional burdens put in this way upon the company decreased by just so much its earning ability.

Some people are very insistent in declaring that a railway company should be required to live up to its "contract" and should haul passengers for the amount mentioned in its franchise after that fare, through changing conditions, has become unremunerative. Such people forget that the State itself has changed that contract in its own interest many times since it was signed so that its nature as a binding force has completely changed, even if there were no other reasons for the payment of a fair return to the company for its property used in public service.

It has been held, at least in New York State, that a law which required a gas company to sell its product at a price which was reasonable when the law was passed would become unconstitutional, because confiscatory, if conditions changed so that the company could not earn a fair return on the value of its property. Such a conclusion seems good law, and it might help in electric railway cases, if not directly by increasing fares, at least indirectly by abolishing some of the transfers and other exactions which have been saddled on the companies since their franchises were obtained.

The Engineer's Place in Electric Railway Rehabilitation

THERE is one part of the electric railway organization that especially needs safeguarding in these times of stress and distress, namely, the engineering staff. No matter how difficult it may be for the moment to find money to make ends meet, the cars must be kept moving and moving to the satisfaction of the public. Adjustment of differences of opinion between the public and the railway owners as to rates of fare and quality of service will be settled fairly and amicably in due course as both sides come fully to understand each other. In the meantime the properties must not be allowed to run down any further than they are at present; in fact they must be rehabiliated. Good engineering and, therefore, competent and loyal engineers are necessary to this end. Fortunate is the railway management that appreciates this fact; the management whose engineers plan to "stick to the job" at least until they are less urgently needed than now.

There is no use in blinding ourselves to the fact that electric railway engineers are discontented under present conditions. These conditions have been largely beyond the control of the managements. But whatever the cause of the conditions the result must not be the weakening of the engineering backbone of the organization. Most of the engineers now engaged in the upkeep and extension (now all too rare) of the track, structures, line and power plant have been with the railways in prosperous days and "stay by the ship" partly through affection developed when engineering work thereon was more interesting and stimulating. Although they may look with longing eyes to other fields, there is something fascinating enough in this one to hold most of them.

It is significant in this connection to note that those engineers who seem best contented at present are the ones who are helping the managements in the solution of greater than engineering problems. Many, for example, are now working on zoning projects, others are investigating the application of one-man cars and the inauguration of the skip-stop system, while still others are laying out big schemes of expansion for the more prosperous days to come. It is perfectly obvious why these men are better satisfied than others. They are living in the future; they are sharing the hopes and expectations of their employers. The latter appreciate that engineering enthusiasm and virility need food, in the shape of confidence and of tasks that are stimulating no matter how difficult.

An engineer has been aptly defined as one who can do for $1 what others require $2 to do. Isn't this just the type of fellow needed in the railway business now? And are not the real railway engineers the mainstay of the managements these days? And is not this the substance of all that has gone before: "If you have good engineers, hold them; if not, get them"?

Why Not Continue to Save Coal After the War?

DURING the past year the shortage of coal and the severe restrictions placed by the Fuel Administration upon its purchase and use have necessitated the most economical operation of power stations in order that the greatest number of kilowatt-hours of energy per ton of coal might be produced. The efforts in this direction have in many cases been greatly handicapped by the fact that plants accustomed and designed to burn high-grade coal have been compelled to burn a coal with heat value greatly reduced from the fuel used in normal times. Many desirable changes have, however, been made, improvements which in many cases could and should have been accomplished without the severe conditions which have made them imperative. Now that many, under duress, have learned of the economies which have long been possible in the generation of power, they look with respect and possibly even with a little jealousy upon those who effected great savings in their power production upon their own initiative.

Much has been said in the past both for and against a bonus system for the power plant. We are inclined to believe that some bonus system is good under almost any condition, but it is clearly understood that a great deal depends upon local conditions and that any bonus plan must be worked out and handled with great care. A very complete and instructive article on the bonus system as used by the Manila Electric Railway & Light Corporation was published in the issue of the ELECTRIC RAILWAY JOURNAL for Feb. 16, 1918, page 308. An equally valuable account of the system used by the Denver Tramway appears elsewhere in this issue. In many respects the two plans are similar while in others they differ widely, and as both have proved unmistakably successful it is well to study them carefully.

The Manila system was inaugurated in June, 1915, with 3.5 lb. per switchboard kilowatt-hour output as a standard basis of coal consumption, the coal used having a heat value of 11,715 B.t.u. per pound. This basis was reduced several times until in September, 1917, the standard was 3.08 lb. or 36,000 B.t.u. per kilowatt-hour. The Denver system started in September, 1917, with 3.1 lb. of coal with a heat value of 9500 B.t.u. per pound, or 29,450 B.t.u. per kilowatt-hour, as a standard, and a bonus is still paid on this basis.

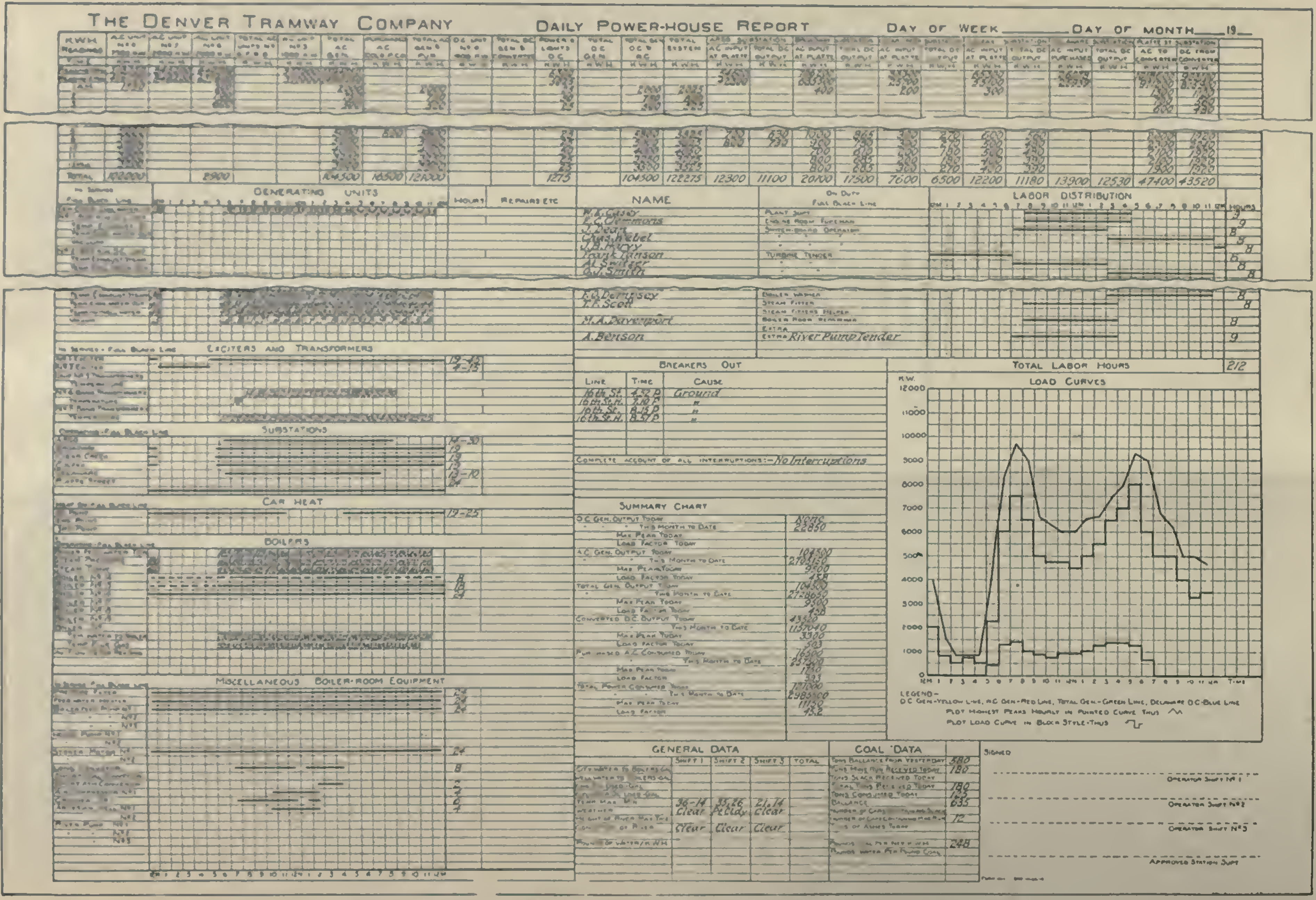
Both systems are alike in that they divide 50 per cent of the value of the coal saved each month among the power-house employees. At Manila, however, this bonus is divided among the men according to the relative value of their occupations, while at Denver all receive equal shares. In Denver the plan is that 90 per cent of the bonus is paid out monthly, 10 per cent being retained and paid semi-annually to all men who have been on the payroll for the previous six months or longer. Both companies adhere to the idea that it is best to pay the bonus on some day other than the regular pay day on account of the psychological effect upon the recipients.

At the time the article on the Manila system was published it was estimated that the saving by the end of 1917 would be 18.5 per cent of 41,000 B.t.u., or in other words, that 1 kw.-hr. would be produced with 33,415 B.t.u. or 2.85 lb. of coal. This saving was attributed equally to the efforts of the employees and the improvements made in the plant. In March, 1917, the coal consumption at Denver reached 5.1 lb. or 48,450 B.t.u. per kilowatt-hour. A new 300-kw. rotary converter was installed at this time and the consumption steadily decreased until in August it was approximately 3.28 or 31,160 B.t.u. per kilowatt-hour. A new 7500-kw. turbine was installed in August and it was estimated that this would further reduce the consumption to 3.1 lb. or 29,450 B.t.u. per kilowatt-hour. Actually this figure has been reduced to an average of 2.5 lb., or 23,750 B.t.u. (in December the actual figure was 2.43 lb.), which would indicate that this further reduction has been largely due to the efforts of the employees, induced by the bonus plan.

Study of Accident Causes Leads to Their Reduction

EMPLOYERS of labor have long known that a high labor turnover is accompanied by an increase in the number of accidents, but real figures on the subject have not always been readily available. Now that the war is over and we may expect greater stability in operating conditions it seems a good time to take stock of the effect of the war on the accident problem. According to some studies made by the General Electric Company, published in a recent issue of *Safety Engineering*, 50 per cent of the accidents which took place within a given period of time occurred to men who had been in the employ of the company less than six months and 80 per cent were due to carelessness. Another point of interest was that the most careful age is 37 while the most accidents occurred to men between the ages of 22 and 26 years and to men over 50 years of age. The experience at the Washington Navy Yard is similar, the lower age limits being 16 to 20 and the higher limit 60. The experience of some of our large steam railways has been that the total annual labor turnover during the war increased from 30 to 50 per cent, the damage to equipment 100 per cent, and 33 per cent of all accidents were chargeable to men who had been in the service less than six months.

These rough figures emphasize the need of thorough training before the new employee is put at a responsible post of duty. They also indicate that the carelessness of youth and the impaired physical faculties of older men are prolific causes of accidents. The figures are therefore of interest to employment agents in connection with the employment of men for a given service. For any railway a complete scientific analysis of all accidents should yield invaluable results both from an administrative and a monetary standpoint. Along this line it may be noted that the experience of the Utilities Mutual Insurance Company of New York has been that marked reductions in the accident compensations of a utility have followed the employment of a safety expert. On more than one electric railway in recent years the portion of gross revenue absorbed by accident claims has been greater than that allotted to dividends. Accident claims are certainly a most unattractive type of disbursement, and if the experience gained from recent abnormal conditions will greatly reduce them the war will have done the industry at least one good turn.



THE DENVER TRAMWAY COMPANY DAILY POWER-HOUSE REPORT DAY OF WEEK ______ DAY OF MONTH ______ 19__

KWH READINGS						TOTAL AC GEN					POWER & LIGHTS DC	TOTAL DC GEN		TOTAL SYSTEM												
TOTAL	122000		8900			104500	16500	121000			1275		104500	122275	12300	11100	20100	17500	7600	6500	12200	11180	13900	12530	47400	43520

GENERATING UNITS — HOURS — REPAIRS ETC

NAME	ON DUTY	HOURS
W.L. Casey	Plant Supt	9
E.C. Clemmons	Engine Room Foreman	9
J. Dean	Switch-Board Operator	8
Chas. Webel		9
J.B. Mccry		8
Frank Janson	Turbine Tender	6
Al Switzer		8
O.J. Smith		8
E.G. Dempsey	Boiler Washer	8
T.F. Scott	Steam Fitter	8
	Steam Fitters Helper	
M.A. Davenport	Boiler Room Foreman	8
	Extra	
A. Benson	Extra River Pump Tender	9
	TOTAL LABOR HOURS	212

LABOR DISTRIBUTION

EXCITERS AND TRANSFORMERS

SUBSTATIONS

CAR HEAT

BOILERS

MISCELLANEOUS BOILER-ROOM EQUIPMENT

BREAKERS OUT

LINE	TIME	CAUSE
16th St.	4.52 P	Ground
16th St. N.	7.10 P	"
16th St.	8.15 P	"
16th St. N.	8.37 P	"

COMPLETE ACCOUNT OF ALL INTERRUPTIONS:—No Interruptions

SUMMARY CHART

D.C. Gen. Output Today	None
" " " This Month to Date	22850
Max. Peak Today	
Load Factor Today	
A.C. Gen. Output Today	107500
" " This Month to Date	2705130
Max. Peak Today	9500
Load Factor Today	458
Total Gen. Output Today	104500
" This Month to Date	2728650
Max. Peak Today	9500
Load Factor Today	450
Converted D.C. Output Today	43520
" This Month to Date	1157040
Max. Peak Today	3300
Load Factor Today	503
Purchased A.C. Consumed Today	16500
" This Month to Date	257300
Max. Peak Today	1750
Load Factor	393
Total Power Consumed Today	121000
" " This Month to Date	2985900
Max. Peak Today	11150
Load Factor	452

LOAD CURVES

LEGEND—
DC GEN-YELLOW LINE, AC GEN-RED LINE, TOTAL GEN-GREEN LINE, DELIVERED DC-BLUE LINE
PLOT HIGHEST PEAKS HOURLY IN POINTED CURVE THUS ⋀
PLOT LOAD CURVE IN BLOCK STYLE-THUS ⎍

GENERAL DATA

	SHIFT 1	SHIFT 2	SHIFT 3	TOTAL
Temp. Max. Min.	36-14	35-26	21-14	
Weather	Clear	Pt. Cldy.	Clear	
	Clear	Clear	Clear	

COAL DATA

Tons Ballance from Yesterday	580
Tons Mine Run Received Today	180
Tons Slack Received Today	
Total Tons Received Today	180
Tons Consumed Today	125
Ballance	635
	72
Tons of Ashes Today	
	248

SIGNED

______ OPERATOR SHIFT No. 1

______ OPERATOR SHIFT No. 2

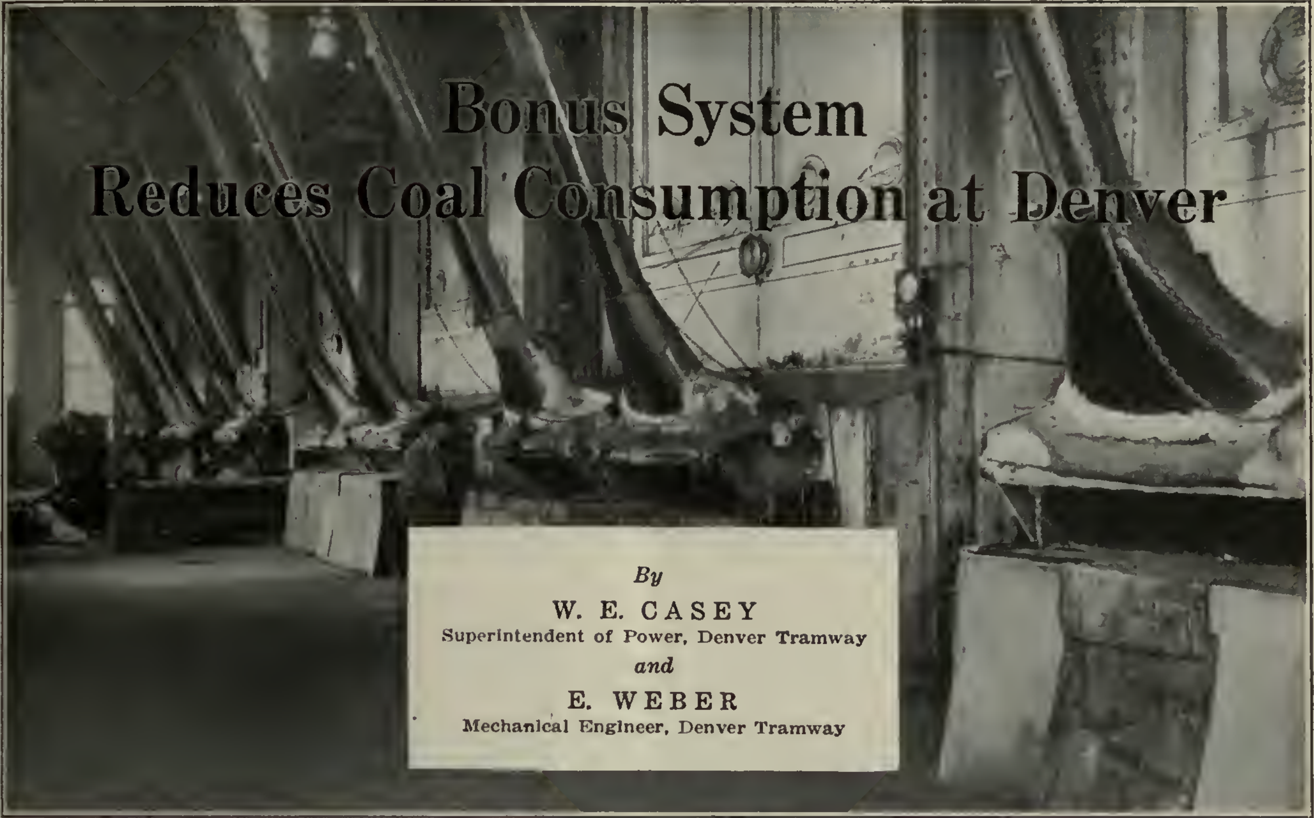
______ OPERATOR SHIFT No. 3

______ APPROVED STATION SUPT.

Daily Log Sheet of the Power Department, Denver Tramway

Bonus System Reduces Coal Consumption at Denver

By
W. E. CASEY
Superintendent of Power, Denver Tramway
and
E. WEBER
Mechanical Engineer, Denver Tramway



750-HP. BOILERS EQUIPPED WITH CHAIN GRATES AND DRAFT GAGES

By Installation of New Turbine and Introduction of Bonus System, Coal Consumption on Denver Tramway System Is Reduced to Less Than 2.5 Lb. per Kilowatt-Hour with Saving in Operating Expenses of About $150,000 per Year

IN THESE DAYS of increased cost of production and operation it will be of interest to many readers of the ELECTRIC RAILWAY JOURNAL to learn how the Denver Tramway has succeeded in improving its power plant and, in spite of the increased cost of labor and coal, how it has by greatly reducing the coal consumption per kilowatt-hour kept the burden from rising to an intolerable extent. Shortly after F. W. Hild was appointed general manager of this company he called in E. A. West, then efficiency engineer of the Portland Railway, Light & Power Company and now chief engineer of the Denver Tramway, to make an investigation and report on the power situation which confronted the company. This report showed that it would be best to install a turbine of capacity sufficient to carry the maximum load of the system,.and in this way to obtain a better average water rate than was possible with a number of small units.

In order to explain more in detail the improvements which were made in the plant, it will be necessary to enumerate the principal apparatus formerly at the power house, which at the end of the year 1915 comprised the following: Thirteen 415-hp. and six 705-hp. Stirling boilers, all equipped with chain grates, superheaters and economizers; three 800-kw. direct-current cross-compound engine-driven generators, one 1600-kw. direct-current, cross-compound engine-driven generator, one 1500-kw. alternating-current, cross-compound engine-driven geerator and two 2000-kw. alternating-current turbo generators. One of the 800-kw. generators had to be scrapped in August, 1916.

The new equipment, construction work for the installation of which was started about August, 1916, included one 7500-kw. turbine, hereafter referred to as No. 8 turbine, with surface condenser, and one 300-kw. rotary converter. Due to delays in delivery, the rotary was not placed in service until March, 1917, and the turbine not until August, 1917, but during the time of construction, or rather after the fall of 1915, the power-house performance was watched closely. Suggestions made by employees were carefully considered and many were adopted. At the same time the employees received advice and instruction so as to enable them better to understand their duties.

It was recognized that in order to obtain the full benefit of the equipment, both old and new, a method would have to be found which would give the men some special interest in their work. After a careful study of the subject had been made a plan for a bonus system was drawn up. In July and August, 1917, the power-house employees were given an opportunity to make their comments on the proposed bonus scale, and with some minor changes the plan was put into operation on Sept. 1, 1917, as described in the following order:

BONUS SYSTEM FOR POWER-HOUSE EMPLOYEES

1. Each employee on the power-house payroll shall be entitled to a bonus, depending on the coal consumption per kilowatt-hour. The method of calculating this bonus will be explained in detail in the following paragraphs:

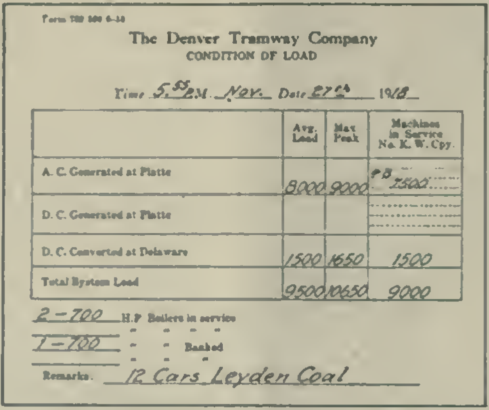
2. The coal used during each month shall be figured from the mine weights. The amounts of coal on hand in bins shall be estimated by the superintendent of power at the end of each month.

RECORD FORMS USED IN DENVER POWER PLANT IN CONNECTION WITH THE BONUS SYSTEM

At top, daily report on load conditions.

In center, No. 8 turbine reports, a.m. and p.m.

At bottom, temporary watt-hour reading record later transferred to log sheet.



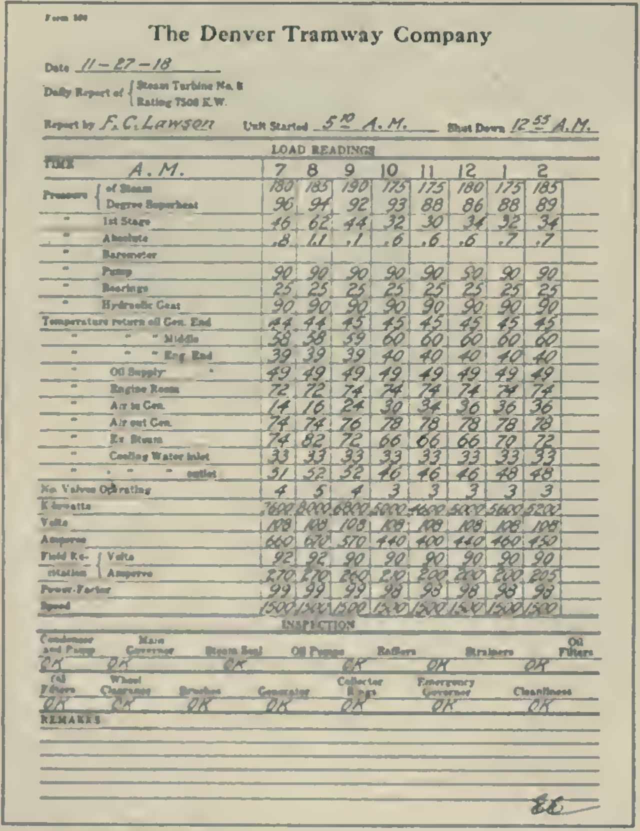
The Denver Tramway Company
CONDITION OF LOAD

Time 5.55 P.M. Nov. Date 27th 1918

	Avg. Load	Max Peak	Machines in Service No. K. W. Cpy.
A. C. Generated at Platte	8000	9000	#8 7500
D. C. Generated at Platte			
D. C. Converted at Delaware	1500	1650	1500
Total System Load	9500	10650	9000

2-700 H.P. Boilers in service
1-700 " " Banked

Remarks. 12 Cars Leyden Coal



The Denver Tramway Company

Date 11-27-18

Daily Report of { Steam Turbine No. 8, Rating 7500 K.W.

Report by F. C. Lawson Unit Started 5.10 A.M. Shut Down 12.55 A.M.

LOAD READINGS

TIME A.M.	7	8	9	10	11	12	1	2
Pressure of Steam	180	185	190	175	175	180	175	185
Degree Superheat	96	94	92	93	88	86	88	89
" 1st Stage	46	62	44	32	30	34	32	34
" Absolute	.8	1.1	.1	.6	.6	.6	.7	.7
" Barometer								
" Pump	90	90	90	90	90	90	90	90
" Bearings	25	25	25	25	25	25	25	25
" Hydraulic Gear	90	90	90	90	90	90	90	90
Temperature return oil Gen. End	44	44	45	45	45	45	45	45
" " " Middle	58	58	59	60	60	60	60	60
" " " Eng. End	39	39	39	40	40	40	40	40
" Oil Supply	49	49	49	49	49	49	49	49
" Engine Room	72	72	74	74	74	74	74	74
" Air in Gen.	14	16	24	30	34	36	36	36
" Air out Gen.	74	74	76	78	78	78	78	78
" Ex. Steam	74	82	72	66	66	66	70	72
" Cooling Water inlet	33	33	33	33	33	33	33	33
" " " outlet	51	52	52	46	46	46	48	48
No. Valves Operating	4	5	4	3	3	3	3	3
Kilowatts	7600	8000	6800	5000	4600	5000	5600	5200
Volts	108	108	108	108	108	108	108	108
Amperes	660	670	570	440	400	440	460	450
Field Excitation Volts	92	92	90	90	90	90	90	90
Field Excitation Amperes	270	270	260	210	200	200	200	205
Power-Factor	99	99	99	98	98	98	98	98
Speed	1500	1500	1500	1500	1500	1500	1500	1500

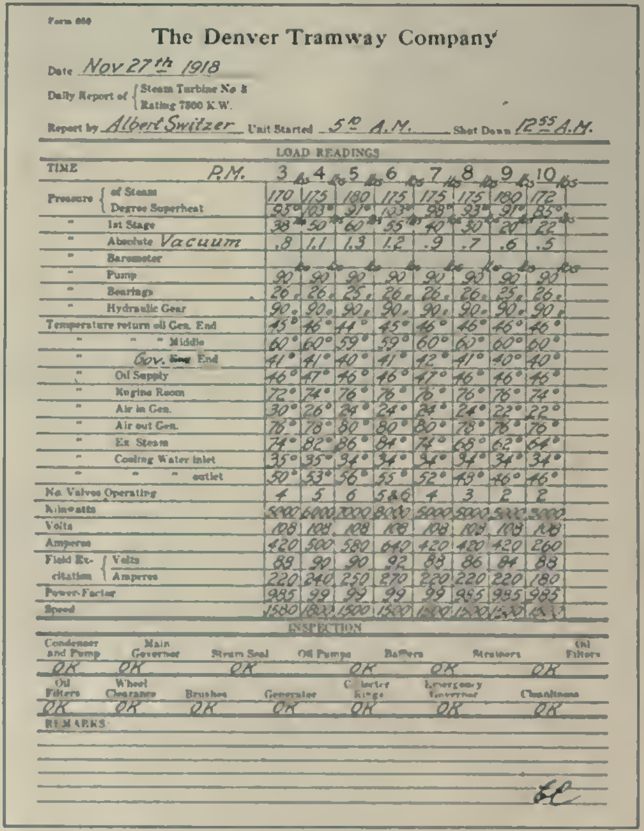
INSPECTION

Condenser and Pump	Main Governor	Steam Seal	Oil Pumps	Baffles	Strainers	Oil Filters
OK	OK	OK	OK	OK	OK	

Oil Filters	Wheel Clearance	Brushes	Generator	Collector Rings	Emergency Governor	Cleanliness
OK	OK	OK	OK	OK	OK	OK

REMARKS

EE



The Denver Tramway Company

Date Nov 27th 1918

Daily Report of { Steam Turbine No. 8, Rating 7500 K.W.

Report by Albert Switzer Unit Started 5.10 A.M. Shut Down 12.55 A.M.

LOAD READINGS

TIME P.M.	3	4	5	6	7	8	9	10
Pressure of Steam	170	175	180	175	175	175	180	172
Degree Superheat	95°	103°	91°	103°	98°	93°	91°	85°
" 1st Stage	38	50	60	55	40	30	20	22
" Absolute Vacuum	.8	1.1	1.3	1.2	.9	.7	.6	.5
" Barometer								
" Pump	90	90	90	90	90	90	90	90
" Bearings	26	26	25	26	26	26	25	26
" Hydraulic Gear	90	90	90	90	90	90	90	90
Temperature return oil Gen. End	45°	46°	44°	45°	46°	46°	46°	46°
" " " Middle	60°	60°	59°	59°	60°	60°	60°	60°
" Gov. ~~Eng~~ End	41°	41°	40°	41°	42°	41°	40°	40°
" Oil Supply	46°	47°	46°	46°	47°	46°	46°	46°
" Engine Room	72°	74°	76°	76°	76°	76°	76°	74°
" Air in Gen.	30°	26°	24°	24°	24°	24°	22°	22°
" Air out Gen.	76°	78°	80°	80°	80°	78°	76°	76°
" Ex. Steam	74°	82°	86°	84°	74°	68°	62°	64°
" Cooling Water inlet	35°	35°	34°	34°	34°	34°	34°	34°
" " " outlet	50°	53°	56°	55°	52°	48°	46°	46°
No. Valves Operating	4	5	6	5&6	4	3	2	2
Kilowatts	5000	6000	7000	8000	5000	5000	5000	3000
Volts	108	108	108	108	108	108	108	108
Amperes	420	500	580	640	420	480	420	260
Field Excitation Volts	88	90	90	92	88	86	84	88
Field Excitation Amperes	220	240	250	270	220	220	220	180
Power-Factor	985	99	99	99	99	985	985	985
Speed	1500	1500	1500	1500	1500	1500	1500	1500

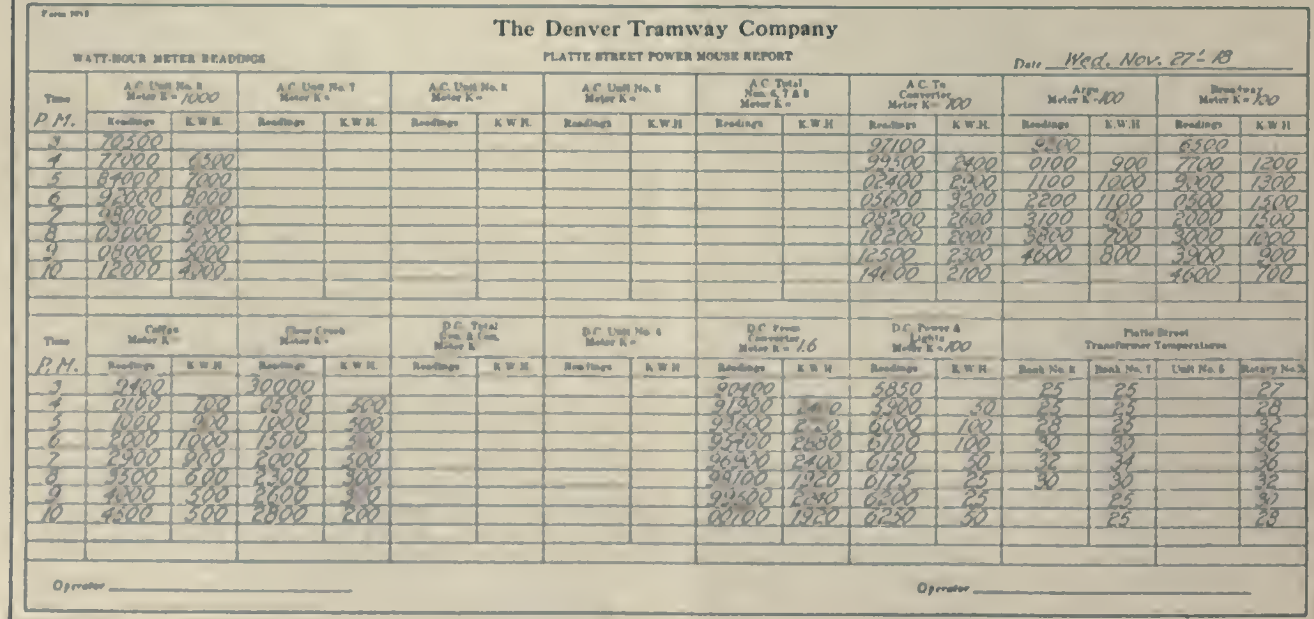
INSPECTION

Condenser and Pump	Main Governor	Steam Seal	Oil Pumps	Baffles	Strainers	Oil Filters
OK	OK	OK	OK	OK	OK	

Oil Filters	Wheel Clearance	Brushes	Generator	Collector Rings	Emergency Governor	Cleanliness
OK	OK	OK	OK	OK	OK	OK

REMARKS:

EE



The Denver Tramway Company

WATT-HOUR METER READINGS

PLATTE STREET POWER HOUSE REPORT

Date Wed. Nov. 27th 18

Time	A.C. Unit No. 8 Meter K = 1000		A.C. Unit No. 7 Meter K =		A.C. Unit No. 6 Meter K =		A.C. Unit No. 5 Meter K =		A.C. Total Nos. 6, 7 & 8 Meter K =		A.C. To Converter Meter K = 100		Argo Meter K = 100		Broadway Meter K = 100	
P.M.	Readings	K.W.H.	Readings	K.W.H.	Readings	K.W.H.	Readings	K.W.H.	Readings	K.W.H.	Readings	K.W.H.	Readings	K.W.H.	Readings	K.W.H.
3	70500										97100		9200		6500	
4	77000	6500									99500	2400	0100	900	7700	1200
5	84000	7000									02400	2900	1100	1000	9000	1300
6	92000	8000									05600	3200	2200	1100	0500	1500
7	98000	6000									08200	2600	3100	900	2000	1500
8	03000	5000									10200	2000	3800	700	3000	1000
9	08000	5000									12500	2300	4600	800	3900	900
10	12000	4000									14600	2100			4600	700

Time	Colfax Meter K =		Cherry Creek Meter K =		D.C. Total Gen. & Con. Meter K =		D.C. Unit No. 4 Meter K =		D.C. From Converter Meter K = 1.6		D.C. Power & Lights Meter K = 100		Platte Street Transformer Temperatures			
P.M.	Readings	K.W.H.	Readings	K.W.H.	Readings	K.W.H.	Readings	K.W.H.	Readings	K.W.H.	Readings	K.W.H.	Bank No. 8	Bank No. 7	Unit No. 5	Rotary No. 3
3	9400		30000						90400		5850		25	25		27
4	0100	700	0500	500					91900	[illegible]	5900	50	25	25		28
5	1000	900	1000	500					93600	[illegible]	6000	100	28	25		32
6	2000	1000	1500	500					95300	2680	6100	100	30	30		36
7	2900	900	2000	500					96800	2400	6150	50	32	34		36
8	3500	600	2300	300					98100	1920	6175	25	30	30		32
9	4200	500	2600	300					99500	2240	6200	25		25		30
10	4500	300	2800	200					00700	1920	6250	50		25		28

Operator ____________ Operator ____________

3. The kilowatt-hour output for the month shall be the entire amount generated for the month and shall include station power and light. The amount used for station power and light shall not exceed 2.5 per cent of the total amount generated if No. 8 turbine is in service, and shall not exceed 4 per cent if No. 8 is in repair. Each 5000 kw.-hr., or fraction in excess of this amount, shall be figured to increase the coal consumption by 0.01 lb. per kilowatt-hour.

4. Steam used for purposes other than power-house operation shall be credited to coal consumption; 5 lb. of steam used shall be estimated to be equal to 1 lb. of coal, or if such steam is paid for in a lump sum, then each dollar shall be considered equivalent to 1000 lb. of coal.

5. The bonus system is based on the present load characteristic and load factor; if either one or both shall change materially it will constitute a cause for a revision of the bonus scale.

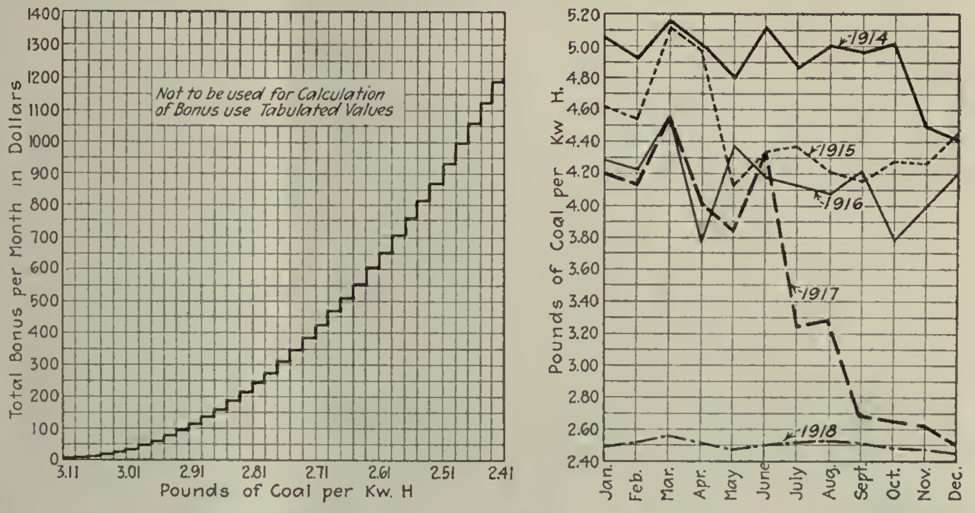
6. If the coal consumption in succeeding months varies more than 0.1 lb. of coal per kilowatt-hour, the chief engineer of the company shall make an investigation before a bonus is paid.

7. The bonus scale is based on lignite coal from the Leyden mine with a heat value of 9500 B.t.u. per pound. If other coal is used the theoretical amount of coal used shall be figured to be in proportion to the heating value of the coal determined by a responsible chemist.

8. The amount of bonus each employee shall receive will be calculated by dividing the total bonus by the number of men on the power-house payroll. In determining the number of men on the power-house payroll, the following rules shall govern:

(a) Extra men taking the place of employees on the sick list shall not be figured as an addition to the number of power-house employees unless on the power-house payroll for a full month or longer. Employees who have been placed on the sick list for six days or longer shall not be entitled to a bonus, but shall be included in the number of power-house employees as long as they remain on the power-house payroll.

(b) Employees taking their vacation shall be included in the number of employees on the payroll and shall receive their bonus, but in case that it is necessary to employ extra men to take the places of men absent on vacation, the total amount of wages paid such extra men shall be deducted from the total amount considered in calculating the bonuses. These extra men shall be entitled to a bonus if they are on the power-house payroll for a full month or longer; but shall otherwise be considered as extra men as outlined above.



AT LEFT, GRAPHIC PRESENTATION OF POWER-HOUSE BONUS SCALE AT DENVER. AT RIGHT, POUNDS OF COAL PER KILOWATT-HOUR CONSUMED IN DENVER POWER PLANT SINCE 1913

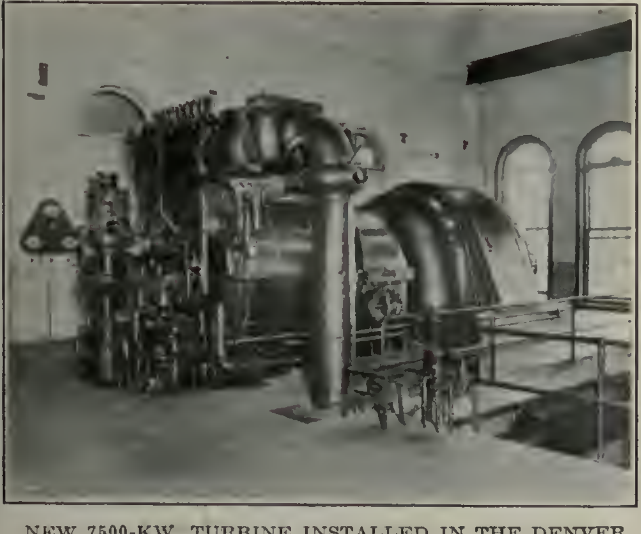
9. If No. 8 turbine has to be taken out of service for repairs and the operating force is not at fault, the bonus shall be calculated in the following manner: The output of the old equipment shall be taken at 4 lb. of coal per kilowatt-hour and the corresponding amount of coal deducted from the total monthly consumption. The resulting quantity of coal which will be found, divided by the kilowatt-hour output of No. 8 turbine, shall be used to determine the bonus.

10. If No. 8 turbine has to be taken out of service for repairs due to faulty operation, the whole engine-room crew shall not be entitled to a bonus. In this case each fraction of a month needed to repair No. 8 shall be considered as a full month.

11. No power-house employee shall be entitled to a bonus if, through his fault, damage is caused to the power-house or any of its equipment, and if inspection of any equipment damaged has been overlooked by the foreman to whom this employee reports, he also shall not be entitled to a bonus.

12. In case of power interruption, due to faulty operation, the bonus will be figured for the total number of power-house employees, but the particular employees at fault for the interruption or bad operation shall not be entitled to any bonus.

13. Payment of the bonus shall be made in the following manner: 90 per cent of the total bonus earned will be paid out as outlined above, 10 per cent will be retained, and this sum so retained will be paid out semi-annually to all men who have been on the power-house payroll for the half year or longer just preceding the date at which this last amount is paid.



NEW 7500-KW. TURBINE INSTALLED IN THE DENVER POWER PLANT

SURFACE CONDENSER AND PUMPS LOCATED UNDER THE TURBINE

14. The following bonus scale shall be used to determine the proper amounts:

Coal per Kilowatt-Hour, Pounds	Total Bonus Per Month	Coal per Kilowatt-Hour, Pounds	Total Bonus Per Month
3.11 to 3.09	$2	2.75 to 2.73	$344
3.09 to 3.07	4	2.73 to 2.71	382
3.07 to 3.05	8	2.71 to 2.69	422
3.05 to 3.03	14	2.69 to 2.67	464
3.03 to 3.01	22	2.67 to 2.65	508
3.01 to 2.99	32	2.65 to 2.63	554
2.99 to 2.97	44	2.63 to 2.61	602
2.97 to 2.95	58	2.61 to 2.59	652
2.95 to 2.93	74	2.59 to 2.57	704
2.93 to 2.91	92	2.57 to 2.55	758
2.91 to 2.89	112	2.55 to 2.53	814
2.89 to 2.87	134	2.53 to 2.51	872
2.87 to 2.85	158	2.51 to 2.49	932
2.85 to 2.83	184	2.49 to 2.47	994
2.83 to 2.81	212	2.47 to 2.45	1058
2.81 to 2.77	242	2.45 to 2.43	1124
2.79 to 2.77	274	2.43 to 2.41	1192
2.77 to 2.75	308	2.41 to 2.39	1262

15. If any employees of the power-house should find the bonus, as figured by the auditor, not to be correct, they can appeal to the chief engineer of the company, whose decision shall be final.

The coal used is a Colorado lignite with a heat value of about 9500 B.t.u. per pound as fired, as indicated in the order. The load on the power plant is purely an electric-railway load, of familiar characteristic form. The guarantees for the large turbine and condenser and some tests on the boilers made it probable that it would be possible to produce a killowatt-hour with 3.1 lb. of coal, as an average for a month, and this was adopted as the standard of fuel efficiency upon which to reckon the savings. If the large turbine is out of order and it is necessary to fall back on the auxiliary equipment, 4 lb. per kilowatt-hour is used as a standard.

BOILER-ROOM BASEMENT SHOWING HOPPERS FOR SIFTINGS FROM CHAIN GRATES AND BUCKET CONVEYORS WHICH CARRY THEM TO OVERHEAD BINS

MANY CHECKING AND ECONOMY DEVICES INSTALLED

The possibility of earning a substantial bonus every month caused every man to consider the losses and how to reduce them. The activity in the boiler room, for instance, was concentrated on stopping air leaks on boiler and economizer settings, while the engine-room force made it a point to use the proper combinations of generating equipment in service. The logsheet and other record forms, reproduced herewith, suggest some of the checking devices installed to assist in the campaign to cut down the coal consumption per kilowatt-hour. In addition recording economy draft gages, thermometers, steam flow meters, and CO_2 recorders are in use. The CO_2 recorder is used as a portable checking device. In connection with the portable draft gage it gives the desired information concerning the condition of the boiler setting, fire, etc. Flue-gas temperatures are taken at intervals. In the boilers the original Stirling arches have been replaced with flat arches, both for reasons of increased economy of operation and because it was believed the flat arch would stand up better and longer. The flat arches have proved to be superior in both ways.

As a result of the improvements the new turbine-generator takes care of all demands and the balance of the generating equipment is held in reserve. Three 750-hp. Stirling boilers take care of the steam demands. Eleven 415-hp. Stirling boilers, together with their equipment such as stokers, economizers, etc., have been removed and sold at a good price. Two more boilers of the same size, with economizers and chain grates and extra chain grates, are for sale now, and as they are in good condition they will probably bring a good price.

The results obtained can probably be best illustrated by the chart on page 269, showing the coal consumption per kilowatt-hour at the present time to be approximately 2.5 lb. (in December actually reduced to 2.46 lb.) which represents a saving in operating cost of approximately $150,000 per year. These results are due partly to the better economy of the large turbine and partly to some other less costly improvements in the boiler room, but in no small degree to the introduction of the bonus plan.

BONUS HAS AMOUNTED TO ABOUT $35 PER MAN PER MONTH

A few words concerning the adopted bonus system may be of interest. The coal consumption per kilowatt-hour is figured for the gross output of the station and includes all power used for the plant, amounting to 1.25 per cent of the gross output. If the coal consumption for net kilowatt-hours is desired the correction should be made.

One of the principles used in working up the scheme was so to arrange the bonus scale that the benefits derived from the special efforts of the employees would be divided evenly between the men and the company, and it was also considered better and simpler to pay all men the same bonus. This has amounted to about $35 per man per month above the regular salary. No especial competition between watches has been encouraged, but as the amount of bonus each man receives at the end of the month depends upon the combined efforts of all, no man is permitted by his companions to "lie down on the job." The daily log sheet, together with the coal book kept by the boiler-room foreman, gives the men all the necessary information so that they can tell where they stand to date on the bonus.

It has been found that the wording of the bonus system order offers sufficient restraint to prevent the employees becoming over-zealous in their efforts, at the expense of the equipment. Thus, in accordance with the order, if No. 8 turbine has to be taken out of service for repairs due to faulty operation, no bonus is paid that month, and if damage is caused to the power house or any equipment through the fault of an employee, he is not entitled to participation in the bonus.

The bonus plan has now been in operation for a little more than one year and no difficulties have arisen. This is probably due to the fact that the whole matter was placed before the men and discussed at meetings prior to the inauguration of the plan, as it was considered very necessary that each man should understand fully the method of calculating his share. One point of interest is that our experience indicates that it is not good practice to pay the bonus on the regular pay day, for in spite of preaching and teaching some of the men form an idea that the bonus is simply wages and not an extra premium for increased efficiency. This point, as a matter of fact, reveals one of the danger marks of the whole bonus system.

Due to the improvements made in the plant, an operating crew of twenty-five men is now required, as compared with fifty-five men formerly. Shifts are now eight hours instead of twelve, and a two-week vacation with pay is granted every man each year. Without doubt the incentive offered by a bonus has increased the economies, and it has also produced a solidarity and co-operation among the operating force which has improved the quality of power service. Cleanliness at the plant is now considered a necessity. Inspection of all parts of the station is made with the greatest care, it being fully understood by the men that laxness may result not only in a pecuniary loss but also in a loss in reputation reflected readily in a decreased amount of bonus earned.

A great deal has been said in the past for and against bonus systems in general, and it is clearly understood that the same system is not suitable for every plant. Our experience, however, with the scheme adopted has worked out exceptionally well not only for both employees and employers, but also for the public in general, through a better utilization of coal and other materials, and an increased reliability in the power supply.

Experience with Pneumatic Sand Cars

A DEVICE that has proved to be very satisfactory in service is a sand car in which the sand is transported in a steel tank which can be put under air pressure for the purpose of forcing the sand out through a hose or spout close to the track. Cars of this kind have been in use long enough to demonstrate their entire reliability. For example, the Philadelphia Rapid Transit Company put a couple of cars in service early in 1913, and they have operated with entire satisfaction and have not introduced any particular maintenance difficulties. There is no trouble through the clogging of sand in the discharge pipe if the sand is perfectly dry. The ease with which sand can be forced out through a pipe under air pressure is surprising, but a glance at an hour-glass in action will readily convince anyone of the "fluidity" of perfectly dry sand. It is certainly a great convenience to utilize this quality in distributing dry sand to carhouses for redistribution to the cars.

When first put into service the Philadelphia cars had but one source of air which had to provide for braking and also for discharging the sand. This proved to be unsatisfactory in that the cars reached the carhouses without full air pressure on the tank and some time was lost in the pumping-up process. Now separate compressors are used for the two functions, with saving of time and lessening of compressor maintenance.

Tool List as Aid in Economical Maintenance of Way

The Pacific Electric Railway Finds Systematic Plan in Posting Tool List to Be Effective in Tool Conservation

By CLIFFORD A. ELLIOTT
Cost Engineer Pacific Electric Railway, Los Angeles, Cal.

IN 1915 the Pacific Electric Railway maintenance of way department established the practice of posting in its section toolhouses and material yards copies of tool lists for mixed or dirt track sections. This was done to aid in the solution of the problem of supplying tools economically to the sections, and the list as prepared included all tool supplies commonly needed on various parts of the system by section men.

In addition to the lists of tools each poster contains descriptions of the tools furnished by the store department, in order to enable the foremen properly to prepare their requisitions when obliged to order new tools or to send tools into the store for shipment to the company's shops for repairs. The list forms part of the generally established standard system of having a fixed classification of all tools, so that the general storekeeper's and auditor's records and accounts shall correspond when inventories are taken or when documents of any nature involving tools are passed between departments concerned.

Each list as posted, also shows the approximate value of each tool, the price set being high enough to cover ordinary price fluctuations, for the purpose of impressing upon those ordering tools the value of each item and the consequent need for persistent watchfulness against loss and breakage. The lists were printed on white linen cloth so as to render them comparatively indestructible.

Each list comprises tools sufficient for a section gang of six men, for sections working entirely on dirt track and for extra gangs working on dirt or ballasted track or track in paved streets. It is assumed that gangs working on ballasted track or track in paved streets require a more varied assortment of tools than does an ordinary section gang confined entirely to maintenance of dirt track. For this reason, in preparing the lists, two distinctions were made, namely, tool requirements for dirt sections and tool requirements for mixed sections. By the term "mixed section" reference is made particularly to sections which perform maintenance work in city paved streets, as well as on dirt and ballasted track outside of the city lines and on interurban track.

During 1917, after the United States entered the war, it was deemed expedient to revise the tool lists in view of the acute shortage of supplies and of the exorbitant prices prevailing. This was done to show the section foremen and their subordinates the relative prices of tools in 1917 as compared with 1915. In revising and reposting the list, the idea was firmly to impress upon the men that tools not only represent so much physical property but that they represent a great deal of money. The purpose was not only to impress the importance of strict economy but also to impel conservation of materials because the company had found it extremely difficult to secure tools of certain standard makes which in peace times it had found to be economical to use.

Private Operation with Public Ownership Seems the Best Solution

By THOMAS E. MITTEN

Chairman, Executive Committee, Philadelphia Rapid Transit Company

T. E. MITTEN

DAVID LLOYD GEORGE, the Prime Minister of England, is credited with the following epoch-making utterance:

We must sweep aside prejudices. The difficulty, believe me, is not with interests, it is with prejudice. And that is equally true in every business. People talk about the vested interests. It is not the vested interests I am afraid of, it is vested prejudices. Sweep these away and the State can easily deal with interests. You must not take any man's property away. You cannot build a great State on dishonesty. You are bound to come to grief if you attempt it.

Therein I believe lies the only hope of a right solution of these great reconstruction problems.

The street railways of the United States form a most vital part of the circulatory system of the business and industrial world, and, if we are to maintain our new leadership in international affairs, they must be made to function properly.

To keep pace with the new order of things, much remedying of our street railway systems will be required. Many of the city traction lines of the United States to-day are in the hands of receivers, others are resorting to increased fares in a futile endeavor to solve their problems, and most of the remaining companies are apprehensively anticipating the future.

The company of which I am the operating head has been able to keep wages up to the standard set by the national war labor board and fares down to a basic charge of 5 cents.

Broadly speaking, the development of street railways has been not so much in the direction of public good as for the advantage of property owners and promoters.

In many cities original grants were made to competitive companies, and lines are still being built to advance real estate values and further private interests. There has, therefore, been a great duplication of tracks, with consequent increased expense of track maintenance and operation.

The high rate of return received by investors in the earlier horse-car days proved to be bonanzas for those who, knowing little and caring less of that which might be in store for the future, considered all earnings available for dividends without regard to the wearing out of the property and the consequent gradual extinguishment of the original investment.

Electricity was later heralded as being the agency to increase speed and also reduce the cost, and thus make for greater profit. It was with this thought that our cities generally required of their street railways large compensation for the right to electrify; this added charge extended in some instances to a complete paving and maintenance of the entire streets on which cars were to be operated.

Franchises have been granted to politicians for hold-up purposes and have then necessarily been purchased by the street railway companies.

The sum of such purchase has been almost invariably added to the cost of the property, so that the burden now carried generally is composed not only of actual costs of development from horse cars to the present modern street railways systems, but, in addition, they have had to carry the cost of duplications, the profiteering of the promoter and the price of peace to the politicians.

The remedy largely lies in the rearrangement of existing street railway lines so that the public may be properly served without maintaining tracks on streets not necessary to proper service.

The prime requisite is, of course, that the cars be so operated as to give the most satisfactory service to the greatest number of people, and that the car rider shall receive the maximum possible for the fare paid.

To correct the injustice of the car rider being obliged to pay for that which represents private gain, it would seem necessary that ownership of street railways be vested in the cities served. By this means only does it seem possible to apply corrective measures with a sufficiently firm hand to insure the revision of the existing lines and the planning of the new, with proper regard for the interests of all.

Municipal operation has not, so far as known, been satisfactorily accomplished in this country. The principle of operating with "service at cost" supplies a well-sounding phrase, but if the management is to be either politically controlled or supplied by inexperienced or incompetent trustees, the result in either case is bound to be disappointing. The successful carrying of a large volume of traffic with a very slight margin of profit must necessarily require an operating management possessing both skill and experience, and there should be a measure of reward commensurate with the service rendered and the results secured.

Co-operation with labor, so much to be desired and so seldom secured, is the keystone of all accomplishment in providing satisfactory service to the public.

The highest wage is the cheapest pay when the men and management unite in a common understanding that the underlying principle of their relation is a good day's work for a good day's pay.

An assured profit fails to supply the necessary incentive to insure either the frugal expenditure of money or the combating of unfair demands from other interests. In other words, the management that has the deciding voice in making expenditures should always stand to lose its reward if guilty of extravagance or incompetence.

The summing up of the foregoing actually points to city ownership and private operation, and if the latter be undertaken under fair and equitable terms and the execution is effective, then the fact that the community served is in a position to cancel the undertaking and change the management will serve not only to keep the management effective but, for the reason that the change can be quickly and easily made, is the greatest assurance that such action will not be taken in a hurried or unwise manner.

Application No. 3808

History of San Diego Electric Railway Told in This Request for Relief Made to California Railroad Commission Proves that Rectitude Affords No Guarantee that Income Will Exceed Outgo

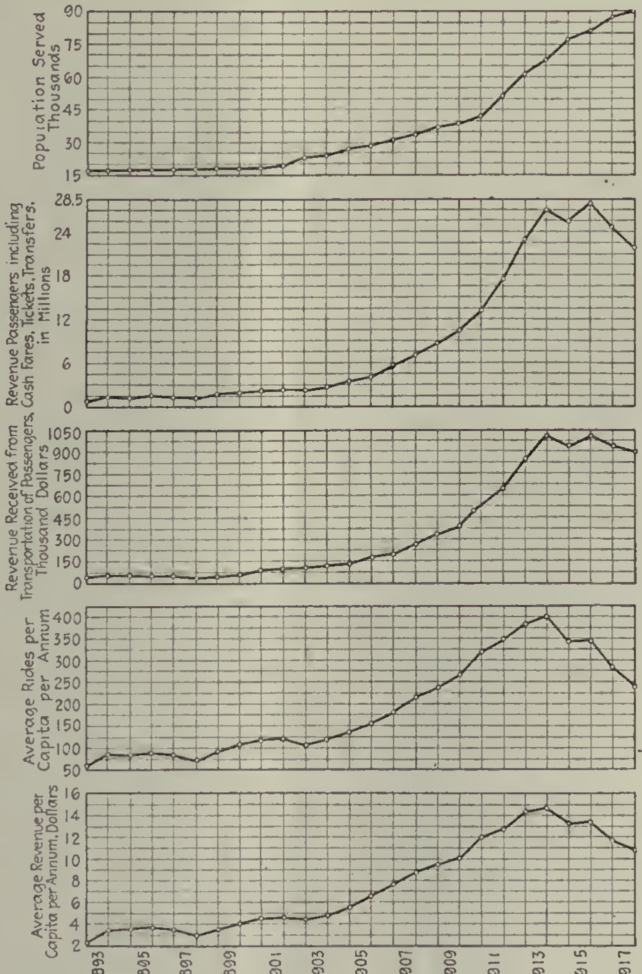
ONE of the most interesting documents ever presented to a regulatory body by an electric railway is the application for relief recently made to the Railroad Commission of California by the San Diego Electric Railway as of Nov. 1, 1918. The petitioner does not attempt to specify the form of help desired, leaving such action to the commission.

Before an abstract of this application is presented it is well to point out the almost unique position of the San Diego Electric Railway. It has nothing to live down in over-capitalization, extravagance of earlier managements, failure to give good service or any other accusation of that kind. On the contrary, it presents the remarkable example of an undertaking that for a long period of years has given far more to the community than it has received, because the property was controlled by the Spreckels family which has kept on putting more and more money into the railway because of its faith in the future of San Diego. It will be seen, however, that the jitney, the private automobile and the war have proved too much even for the patience and the pocket of a Spreckels. This application, which is abstracted in the following paragraphs, was prepared for the San Diego Electric Railway by E. J. Burns, public utility adviser, San Diego. The application opens with an extract from a speech made by Max Thelen, then president of the Railroad Commission of California, before the University of California Extension Course, March 6, 1918, in which he pointed out that when a street railway asks for relief it must come prepared to show that it has eliminated all unnecessary expense and has introduced all economies of operation compatible with the continuation of reasonably good service to the patrons. Among these features Mr. Thelen classed skipstops, elimination of needless car mileage, reduction of heating and use of one-man cars. Following this appears the correspondence of last February between President Wilson and Secretary McAdoo urging that state and local authorities afford prompt relief to the public utilities.

SAN DIEGO DEVELOPED BY ITS STREET CARS

Taking as a guide, the sentiments expressed by Messrs. Thelen, Wilson and McAdoo, Mr. Burns begins by saying that the first obligation of an electric railway is to produce and furnish the traveling public with the most efficient service it can afford to give. The city of San Diego would not have grown so rapidly if the San Diego Electric Railway had not been so keen to take advantage of the rapid improvements in electric railway equipment.

Like other street railways, the system had its beginnings in a number of small, disconnected horse lines. The cars weighed about 1500 lb. each, seated ten to fifteen passengers, cost say $1,500 each and ran on 12-lb. to 30-lb. rail. The present cars weigh 43,500 lb., seat fifty-two passengers and run on 60-lb. to 114-lb. rail. The system grew from 10 miles to 86 miles. The only thing common to the old times and the present day is the 5-cent fare. The system made possible the development of outlying districts, but if it is now held down to a fare that will not pay for good service a decline in values and a stoppage of development will inevitably occur. Since good service cannot be maintained without an increase in revenue the property owners should not put forth the argument that higher fares will tend to decrease the value of their property. In any event, the value of the real estate is due largely to the railway, and if it is necessary to adjust the rates of fare, it would appear that possibly some adjustment will be necessary in realty values. At no time has the railway itself exploited any land in the city of San Diego or outlying districts. Therefore, it has not benefited by additions or extensions other than from



THESE GRAPHS SHOW OPERATING RECORDS AT SAN DIEGO FOR THE LAST TWENTY-FIVE YEARS, TOGETHER WITH STATISTICS OF POPULATION AND RIDING HABIT its transportation business. The electric railway spent more than $1,000,000 in extra car, power and terminal facilities to take care of the business expected at the time of the 1915 exposition, but it did not receive enough income from transportation in return to pay its operating expenses, depreciation charges, taxes and bond interest. This result was due to unfair jitney competition, permitted in direct contravention of the railway's exclusive franchise, and it cost the San Diego Electric Railway between $400,000 and $500,000. This loss from jitney competition is small, however, compared to that caused by the depreciation of the railway's securities.

Up to 1913 the business of the railway kept pace with the growth of the city. The city has continued to progress but not the railway.

WHY MORE CAPITAL MUST BE RAISED

To interest capital it is necessary to offer an investment that appears to have a future. Investors in street railway securities now know that the business is decreasing; that it requires a larger annual investment than in the past to produce the same commodity but that the price paid for the commodity is the same, and that the chances for a fair rate of return are discouraging. To invest in street railway securities is not even an interesting game of chance. The prospective investor knows perfectly well beforehand that he will lose and is no longer willing that the public should get street railway service at his expense.

> THE public utility regulations do not permit the railway to earn a sufficient surplus during good times to take care of the poor years. Therefore, when costs go up, rates should likewise go up. The car riders should bear in mind that the relief now asked for should have been requested at a much earlier date.
>
> —*From San Diego Application*

From its organization twenty-six years ago to Dec. 31, 1917, the railway has expended approximately $6,000,000 for construction, new property, extensions, improvements and betterments. No matter how good this property is to-day, it will not last forever. Consequently, the company will be faced by some very difficult problems as the time for replacements approaches because:

The income from operation has not been sufficient to set aside a depreciation or deferred maintenance fund;

The income has not been sufficient to pay for additional bond interest and sinking fund requirements;

The income has not been sufficient to pay any return whatsoever on outstanding capital stock since 1914;

The cost of replacing the property now worn out has increased from 50 to 200 per cent without a corresponding increase in quantity of business;

The general forty-one-year franchise expires in thirty-two years, so no refunding bond issue is possible;

The company's past experience proves conclusively that it will be necessary to reconstruct the property every fifteen years during the life of the present franchise;

The expenditures necessary to replace the property during the life of the present franchise will not be less than $6,500,000. This added to the $6,000,000 already invested in the property makes a total investment of $12,500,000. The present income of the company is insufficient to set aside one dollar to retire this investment at the expiration of the present franchise.

The company is required by law to render adequate service, to extend its facilities from time to time within the territory served, to make large expenditures for street work, changes in grade, etc.

The variation in earning power makes the electric railway industry hazardous from the investor's viewpoint, and the uncertainty of the return makes a difficult situation to overcome in securing capital for future replacements or improvements.

There is a marked tendency on the part of some of the newspapers and the people of California toward municipal ownership. This must receive serious consideration by investors or prospective investors in public utility securities.

IS THE FRANCHISE AN ASSET OR A LIABILITY?

Under the uniform system of accounting, officially accepted by the California Commission, Account No. 545, Franchises, provides that the franchise account shall include actual amounts paid to a state or political subdivision thereof in consideration of franchises, etc. The San Diego Electric Railway has every reason to believe that the value of its franchise should be carried on the liability side rather than on the asset side of its books due to the burdens imposed upon the carrier in its endeavor to live up to all the franchise requirements. The cost of the franchise works out as shown in Table I:

TABLE I—TOTAL COST OF FRANCHISE

Cost of franchise	$86,000
Cost of initial paving	507,000
Cost of maintaining paving	200,000
Bond interest initial paving	129,000
Cost of franchise tax *	106,000
Total	$1,028,000

*2 per cent of gross receipts to date.

Of the foregoing sum, $696,000, or $116,000 a year, was spent between 1912 and 1917 inclusive. During the latter period the taxable gross operating revenue was $5,700,000, or $950,000 a year. This means that the actual franchise tax has been 12.2 per cent of the taxable gross operating receipts during the period 1912-1917.

During its entire life, from 1892 to 1917 inclusive, the San Diego Electric Railway has paid in cash $603,000 more to the city for the privilege of conducting transportation than it has to the stockholders who furnished the money for the construction of the transportation facilities.

The electric railway is no different from any other industrial enterprise as regards the relation between cost of manufacture and selling price. In this case the commodity produced is transportation. When the cost of manufacturing transportation advances, the selling price must also advance if the quality of the commodity is to be maintained. Yet in the case of street railways, the popular thought is that the selling price of transportation should be the same regardless of increases in the cost of manufacture. How this condition can be maintained without killing the industry has not been explained. Nothing could show more clearly than this the need for a common understanding and co-operation on the part of the public, public service commissioners and utility operators.

In San Diego or any other city it certainly should not be expected that the capital was invested solely to provide the community with transportation. When the present investors made possible the city's transportation system, that investment was made for the purpose of receiving a fair profit.

To figure intelligently the net result of manufacturing transportation, the elements of cost should first be considered. These include labor and material for maintenance and operation; charges for depreciation of physical plant; taxes and interest on bonds and loans. Deduct these charges from the income received, and the remainder is profit. If there is a remainder it goes to the investor who made possible the production of the commodity, transportation. If nothing remains, then the investor, as in the case of the San Diego Electric Railway, is "out of luck." As a matter of fact, the San Diego stockholders have received no profit on their capital stock since the year 1914.

DEPRECIATION IS AN ELEMENT OF OPERATING COST

Mr. Burns then points out that the standard system of accounting allows only for normal or every-day maintenance and operating expenditures but not for the cost of depreciation due to inadequacy, age or obsolescence. Replacement due to obsolescence is one of the most important items of depreciation. It represents the cost of keeping up to date.

Replacements merely represent maintenance or operating expenditure and therefore should not be charged to capital account unless the cost of replacing in kind exceeds the original investment of the replaced property. The necessity of making replacements, due to depreciation, occurs over a period of years; hence the necessity of a replacement fund to replace worn-out property promptly.

Book figures and guessing are no longer admissible in allowing for depreciation. Local conditions and the past experience of the utility must be considered. The uniform system of accounts provides depreciation accounts in which to include monthly charges to cover depreciation of way and structure, equipment, power plant buildings and power plant equipment for creating reserves. Since July 1, 1914, the accounts also provide that carriers shall accrue depreciation on equipment included in accounts 530 to 535 inclusive, but the accrual of depreciation of way and structures, power plant buildings and power-plant equipment is left optional with the carrier until such time as the commission may direct otherwise.

There is no apparent good reason why the classification should not require the carrier to accrue depreciation on all classes of depreciable property. The thought that it should not be necessary to accrue depreciation on way and structure and power-plant buildings and equipment for the reason that safe and economical operation necessitates constant maintenance of such units to a point of efficiency of their original physical condition is very misleading. Steam and interurban track can be maintained in a high state of excellence without interrupting the service, partly because of the open construction and partly because of the long headways. However, street railway service is operated at headways from one to ten minutes. In most cases the track is imbedded in concrete pavement, so that when renewals occur it is not merely a question of replacing rails but of an entire section of track or pole line. This makes it difficult to draw the line between depreciation and maintenance. Therefore, it would appear to be much better to include monthly charges to cover depreciation of way and structures, power-plant buildings and power-plant equipment in the same manner as the classification provides for the accrual of depreciation of equipment.

Prior to Jan. 1, 1915, it was the policy of the San Diego Electric Railway to accrue depreciation on way and structures, equipment, power-plant buildings and power-plant equipment. However, due to the decrease in the railway's income and the increase in the railway's outgo, this depreciation program was changed on the date named. For the present, only accruals are being made on equipment as required by the uniform classification of accounts. The railway in changing its depreciation program did so only until such time as the income from the operation of the property would be sufficient to make monthly charges to cover all depreciable property. During the years 1912 to 1917 inclusive, $600,535 was charged through the operating accounts as a reserve for accrued depreciation as shown by the following figures:

> TO INVEST in street railway securities is not even an interesting game of chance. The prospective investor knows perfectly well beforehand that he will lose and is no longer willing that the public should get street railway service at his expense.
>
> —*From San Diego Application*

Way and structures	$238,468
Power plant	102,108
Equipment	259,959
Total	$600,535

Of this amount $69,900 has been debited to reserve for accrued depreciation, leaving a balance of $530,635, which was reinvested in the property.

This money was used principally in financing improvements during 1915 and 1916, as it was impossible to sell the bonds authorized for that purpose at the price set by the commission. This depreciation fund is now urgently needed to make replacements of worn-out or obsolescent equipment.

In the San Diego Electric Railway, the fund for accrued depreciation was reinvested in the property for additions and betterments, and the use of this money dispenses with the necessity of additional interest-bearing capital until such time as the fund is needed for its original purpose. The time has now arrived when that money is needed, but due to the decrease in the railway's securities, it is impossible to convert the investments in which the money was invested into cash without a large discount and additional burdens to the fixed charges. The $530,635 representing reserve for accumulated depreciation already reinvested in the property would entail a considerable additional burden on the fixed charges. Of the $4,497,000 bonds (face value) authorized by the commission on Oct. 6, 1914, 3920 $1000 bonds were sold at 85 per cent, netting $3,332,000, and there still remain unissued 577 bonds of the par value of $577,000, or $490,450 if sold at 85. The net proceeds received from the sale of these bonds would be insufficient to return the entire reserve for accrued depreciation by $40,185. In the second place, if the bonds could be sold at 85 per cent of their face value, the railway would be compelled to increase its annual fixed charges as follows:

Sinking fund requirements	$5,770
Discount	380
Interest at 5 per cent	28,850
Total	$35,000

Therefore, the cost of money per annum to replace the fund for accrued depreciation would amount to 6.55 per cent.

The income from operation is insufficient to care for this additional burden, and there is no reason to doubt that the commission would refuse to sanction a future bond issue as the income would be insufficient to pay bond interest and sinking fund requirements. Short-term notes at a much higher rate of interest are also out of the question. Another chance for the return of the depreciation fund would be the sale of stock or a stock assessment. The result of such a course may be guessed from the circumstance that the stockholders received no dividends at all for the first fifteen years, 1892 to 1908, and for the last three years, 1915 to 1917. The stockholder ought to be protected the same as the bondholder.

Another matter of vital importance to the stockholder is that of securing additional capital required in excess of the depreciation fund at the time of making replacements. Equipment purchased ten years ago and depreciation accruals based on costs at that time and charged off yearly during the useful life of such equipment, will not be sufficient to provide adequate capital to replace the equipment when it is outworn. Assume a mile of track constructed in 1910 with 60-lb. rail at a cost of $30,000 per mile and assume its life as ten years, also that one-tenth of the original cost has accrued annually during its useful life. By 1920, however, the carrier would discover that the cost of replacement was not $30,000 but $60,000. Where is the additional capital, $30,000, to come from? The problem would be simple if there were a progressive growth of the business, but not if the business has stopped growing or even declined. In brief, the railway is then in the same position as the jitney-bus operator who existed off of his investment.

OUTGO EXCEEDS INCOME

It would seem clear that the serious financial situation of the San Diego Electric Railway is due to the need of rates of fare that will yield more revenue than that now paid by the consumer for the commodity transportation. To furnish efficient service at a price less than the cost of production is nothing short of confiscation. There should be no half-hearted relief. The people of San Diego might just as well understand that only permanent relief will save this railway from the fate of its predecessors. The railway's financial condition is not the result of over-capitalization, corrupt methods, frenzied finance or the payment of large and exorbitant dividends to the stockholders. In fact, Commissioner Thelen himself said on Sept. 29, 1912, in connection with Application 1206 of this company:

"There is no question about your honesty in the past. This corporation is one of the most honest utilities I have run across."

Table II illustrates clearly the need for some immediate relief, showing the income and outgo for the year ending Dec. 31, 1917; the income and the outgo per dollar of business are shown in Table III, while the operating data for the year ending Dec. 31, 1917, are shown in Table IV.

Table III shows that the deficit for the year ending Dec. 31, 1917, was $384,689. Table III points out that the investment in physical property represents $5.57 per dollar of business. The income was but 18.2 per cent on the investment, whereas 25.6 per cent was necessary to come out even. It cost the railway $1.406 for each $1 of business handled.

TABLE II—INCOME AND OUTGO FOR THE YEAR ENDED DEC. 31, 1917

Income	Amount	Per Cent
Revenue from transportation of passengers	$892,166	94.22
Revenue from other railway operations	44,245	4.68
Non-operating income	10,451	1.10
Total	$946,863	100.00
Outgo		
Operating expenses (includes $172,163 uncharged depreciation)	841,802	88.91
Taxes assignable to railway operation	74,264	7.84
8 per cent return on book cost of physical property, amounting to $5,193,583	415,486	43.87
Total outgo	$1,331,553	140.62
Outgo exceeds income by amount of	384,689	40.62
Necessity and Disposition of 8 Per Cent Return on Investment		
Interest on $3,842,000 bonds at 5 per cent	$192,100	46.23
Bond retirement sinking fund	39,200	9.44
Amortization of bond discount and expense	14,776	3.56
Interest on unfunded debt	18	0.01
Conductors' and motormen's accident fund	13,125	3.16
Miscellaneous income deductions	482	0.12
Entries direct to profit and loss	31,797	7.63
6 per cent dividend on $1,250,000 capital stock	75,000	18.05
To surplus	48,986	11.78
Total	$415,486	100.00

TABLE III—INCOME AND OUTGO FOR EACH DOLLAR OF BUSINESS DONE IN YEAR ENDED DEC. 31, 1917

Income:	
Operating revenue	$0.989
Non-operating income	.011
Total income	$1.000
Outgo:	
Operating expenses	$0.889
Taxes assignable to railway operation	.078
8 per cent return on book cost of physical property	.439
Total outgo	$1.406
Recapitulation	
Income	$1.000
Outgo	1.406
Outgo over dollar of income	$0.406

Again, Table IV shows that for every revenue car-mile run there was a loss of $0.1058. During the year, 14,864,600 cash-fare passengers were carried. The income at 5 cents per passenger was $749,047.80. The revenue ticket passengers carried amounted to 3,913,911, yielding $143,118.86, or $0.9365 per revenue ticket passenger. To yield sufficient revenue to pay all expenses as shown in Table II, the rate of fare per cash passenger would have been $0.0753 and the rate of fare per revenue ticket passenger would have been $0.94.

During 1917, the average income per revenue passenger, which includes cash fare and revenue ticket passengers, was $0.0504 and the average outgo per revenue passenger was $0.0716. Therefore, the outgo per revenue passenger was $0.0212 more than the income.

Every effort has been made by the company to effect economies along the lines laid down by Commissioner Thelen in his address before the University of California. The skip stop was established as early as June 1, 1916, and has now been carried to the point where 625 stops have been reduced to 486, a reduction of 139. Considering 636 as the number of total stops possible, there had been eliminated 150 by July 1 or a little more than 23 per cent. The average probable stops eliminated is two and one-half per trip for all of the lines where skip stops have been installed. By means of the "Economy" watt-hour meter, a number of tests were made with both a center-entrance car and a California type car which was typical of those converted to one-man operation. These tests indicated that the skip stop would save 350,600 kw.-hr. a year. The saving, however, is by no means proportionate to the reduction in energy requirements. Labor and certain fixed items are not affected at all. Fuel and water, however, can be reduced in direct proportion, and it may be assumed that this would also hold true of lubricants and miscellaneous power-plant supplies. It is estimated that during 1919, the total output of the San Diego plant will amount to 11,040,000 kw.-hr., while the cost of fuel, water, lubricants and miscellaneous items will amount to say $116,395, making the cost per kilowatt-hour $0.0105. Therefore, the 350,600 kw.-hr. saved mean only a net saving of $3,681 on the power-house end.

> THE electric railway is no different from any other industrial enterprise as regards the relation between cost of manufacture and selling price. In this case the commodity produced is transportation. When the cost of manufacturing transportation advances, the selling price must also advance if the quality of the commodity is to be maintained. Yet in the case of street railways, the popular thought is that the selling price of transportation should be the same regardless of increases in the cost of manufacture. How this condition can be maintained without killing the industry has not been explained. Nothing could show more clearly than this the need for a common understanding and co-operation of public, regulators and operators.
>
> —*From San Diego Application*

TABLE NO. IV—OPERATING STATISTICS FOR YEAR ENDED DEC. 31, 1917

Total investment (book value) physical property	$5,193,585.00
Miles of track owned	74.06
Investment per mile of track	$70,126.72
Investment per dollar of business	$5.54
Revenue car-miles operated	3,635428
Revenue Passengers Carried:	
Cash-fare passengers	14,864,600
Revenue ticket passengers	3,913,911
Revenue transfer passengers	3,194,643
Total revenue passengers carried	21,973,154
Income and Outgo per Revenue Car-Mile:	
Income per car-mile, cents	26.04
Outgo per car-mile, cents	36.62
Deficit per car-mile, cents	10.58
*Income and Outgo per Revenue Passenger:	
Income per revenue passenger, cents	5.04
Outgo per revenue passenger, cents	7.16
Deficit per revenue passenger, cents	2.12

* Includes cash fare and revenue ticket passengers only.

As early as July 1, 1915, the railway began to eliminate all such unproductive mileage as could be discontinued without hardship to the public.

The privately-owned automobile is making serious inroads in the passenger revenue. Just how to meet this competition is a serious question. There are more permanent residents in San Diego now than in 1913, but the railway is carrying fewer passengers per capita per annum. The advent of the private machine has changed the whole aspect of the electric railway situation as now there is competition. A few years ago a ten-minute headway with an average speed of 9 m.p.h. was considered *de luxe* service, but the public has since been educated to faster and more frequent service. If the electric railway expects to stay in business, it must meet these new conditions. Therefore, care must be exercised in curtailing service. In Mr. Burn's opinion, nevertheless, the time when the automobile will replace the street car is far distant. On this point he quotes from one of John A. Beeler's reports on the Washington traffic situation, in which Mr. Beeler showed that at Fifteenth Street and New York Avenue, for example, it was observed that 1135 autos carried only 2144 persons or an average of 1.89 persons per vehicle whereas 203 street cars carried 7541 passengers or 37.15 per vehicle. Mr. Beeler also found that it takes less than three seconds longer to pass a street car, carrying nearly forty persons, through a given intersection, than it does to pass an automobile carrying less than two. (See ELECTRIC RAILWAY JOURNAL for July 27, 1918, page 147.)

At San Diego, the practice of neighbors picking up friends in their machines had grown greatly. To learn what this kind of competition and other factors were doing, the company made a traffic survey between the hours of 7 and 9 a.m. on Aug. 15, 17 and 21, 1918, at four points with the results shown in Table V.

This survey showed an average of 1.75 passengers per competitive vehicle and 22.61 passengers per street car.

TABLE V—VEHICLES COUNTED IN TRAFFIC SURVEY

Class of Vehicle	Number	Passengers
Automobiles	652	1,205
Motorcycles	50	54
Bicycles	42	44
Total of above	744	1,303
Street cars	70	1,583

Operation with one-man cars began as early as Feb. 19, 1916, and at present four lines are so equipped. The cars used at present are 40-ft. rebuilt California type, seating forty-four and weighing 34,100 lb. each. They replaced 48-ft. center-entrance cars seating fifty-two and weighing 43,500 lb. each.

The principal saving effected consists of platform and power expense. This amounts to $27,124.35 per annum or $0.0437 per car-mile, as shown in Table VI.

During September, 1917, the company equipped 100 cars with "Economy" watt-hour meters, which have also been the means of reducing the energy consumption per car-mile. Comparison of the year 1918 with the year 1917 shows a decrease in energy consumption of 3.11 per cent; comparison of 1918 and 1916 a decrease of 8.5 per cent and of 1918 with 1915, a decrease of 15.41 per cent.

It is impossible to trace the power economies through the operating accounts due to the continued increase in the cost of fuel oil. In order to show the relative value of what results have been obtained, Table VII has been prepared, based on the 3,900,000 estimated car-miles for 1919, showing the cost of operation per car-mile based on 2.8 kw.-hr. per car-mile which is the estimated consumption average for the year 1919, and 3.31 kw.-hr. per car-mile, representing the power consumed during the year 1915. By consuming 2.80 instead of 3.31 kw.-hr. per car-mile, the saving in energy would amount to 1,989,000 kw.-hr. At present, 182 kw.-hr. are produced per barrel of fuel oil. On this basis, 60,000 barrels would be needed to produce the 10,920,000 kw.-hr. estimated for 1919. The number of barrels saved by reducing the car-mile consumption from 3.31 to 2.80 kw.-hr. would be 10,928 or $18,796.16. The allocation of the several classes of power saving is shown in Table VIII.

The efficiency of the company's plant is not apparent from a survey of the operating accounts due to the continued increase in the cost of fuel oil. In 1916, the company paid 66½ cents per barrel for fuel, and during 1918 it had to pay $1.45. The increased cost of this item amounts to $39,322.72 or 118.04 per cent. It is now estimated that the price of fuel oil will advance to $1.72 in 1919. Table IX shows the increased efficiency of the power plant, from which it will be seen that in comparing the year 1919 with 1914, the increase in the output per barrel of fuel oil is 15.2 kw.-hr. or 9.11 per cent and the decrease in the cost per kilowatt-hour $0.00086 or 8.34 per cent, a total saving of $10,196.16 in the cost of fuel oil. This saving is attributed to the Merit Automatic Oil Strocking System which was installed the latter part of 1917.

The total economies effected per annum by the company are:

Skip-stop operation	$3,681
One-man car service	27,124
Car economies	14,598
Power plant economies	10,196
Total	$55,519

THE ELECTRIC RAILWAY IS THE SICK MAN OF BUSINESS

In summing up the situation, the electric railway might be considered the sick man of business, so sick that the disease is beyond the comprehension of the

TABLE VI—ECONOMIES EFFECTED IN THE OPERATION OF ONE-MAN CAR SERVICE PER ANNUM

Item	Route No. 5	Route No. 6	Route No. 8	Route No. 13	Total
Cars operated	4	2	2	2	10
Car-miles per annum	265,400	115,000	99,300	140,525	620,225
Car-hours per annum	28,105	14,200	13,870	13,651	69,825
Car-miles per car-hours	9.44	8.09	7.16	10.3	9.00
Operation of Two-Man Car Service					
Platform expense per annum	$22,192	$11,096	$9,986	$11,095	$54,370
Platform expense per car-mile	$0.0836	$0.0964	$0.1009	$0 0789	$0 0876
Kilowatt-hours consumed per car-mile	2.8	2.8	2.8	2 8	2.8
Cost per kilowatt-hour	$0 015	$0.015	$0.015	$0.015	$0.015
Kilowatt-hours consumed per annum	743,120	322,000	278,040	393,470	1,736,030
Cost of power per annum	$7,802	$3,381	$2,919	$4,131	$18,234
Cost of power per car-mile	$0.0294	$0.0294	$0 0294	$0.0294	$0.0294
Total platform and power expense, per annum	$29,994	$14,477	$12,905	$15,227	$72,600
Total platform and power expense per car-mile	$0 1130	$0.1258	$0.1303	$0 1083	$0 1170
Weight of equipment, pounds	43,850	40,520	40,520	43,850	42,185
Operation of One-Man Car Service					
Platform expense per annum	$12,344	$6,059	$5,767	$5,680	$29,851
Platform expense per car-mile	$0.0466	$0.0526	$0.0580	$0.0404	$0.0481
Kilowatt-hours consumed per car-mile	2.4	2 4	2.4	2.4	2.4
Cost per kilowatt-hour	$0.0105	$0.0105	$0.0105	$0.0105	$0.0105
Kilowatt-hours consumed per annum	636,957	276,000	238,320	337,260	1,488,537
Cost per power per annum	$6,688	$2,898	$2,502	$3,541	$15,629
Cost of power per car-mile	$0.0252	$0.0252	$0.0252	$0.0252	$0.0252
Total platform and power expense per annum	$19,082	$8,957	$8,269	$9,221	$45,430
Total platform and power expense per car-mile	$0 0717	$0.0778	$0.0832	$0 0656	$0.0733
Weight of equipment, pounds	34,100	34,100	34,100	34,100	34,100
Decrease from Operation of One-Man Cars					
Platform expense per annum	$9,847	$5,037	$4,219	$5,415	$24,510
Platform expense per car-mile	$0.0371	$0.0438	$0.0429	$0.0385	$0.0395
Kilowatt-hours per car-mile	0.4	0.4	0.4	0.4	0.4
Kilowatt-hours consumed per annum	106,163	16,000	39,720	56,210	248,090
Cost of power per annum	$1.114	$485	$417	$590	$2,604
Cost of power per car-mile	$0.0042	$0.0042	$0.0042	$0 0042	$0.0042
Total platform and power expense per annum	$10,962	$5,520	$4,636	$6,005	$27,124
Total platform and power expense per car-mile	$0.0413	$0 0480	$0.0421	$0.0422	$0.0437
Weight of equipment, pounds	7,750	6,420	6,420	7,750	8,085

TABLE VII—POWER ECONOMIES UNDER PRESENT ENERGY PER CAR-MILE AS COMPARED WITH THE ENERGY CONSUMED IN 1915

Item	2 80 Kw.-Hr. per Car-Mile	3 31 Kw.-Hr. per Car-Mile	Decrease Amount	Decrease Per Cent
Car-miles operated	3,900,000	3,900,000	...	..
Kilowatt hours consumed per car-mile	2.80	3 31	0.51	15 41
Kilowatt-hours consumhd per annum	10,920,000	12,909,000	1,989,000	15.41
Kilowatt-hours produced per barrel of fuel	182 0	182 0		
Total barrels of fuel consumed	60,000	70,928	10,928	15 41
Cost of fuel per barrel	$1.72	$1 72		
Total cost of fuel	$103.200	$121,996	$18,796	15 41
Cost per car-mile	$0 0264	$0 0312	$0 0048	15 38

TABLE VIII—POWER SAVING AT SAN DIEGO

	Kilowatt-hours	Barrels Oil	Money
Skip-stop plan	350,600	1,926 37	$3,313
One-man operation	248,093	1,363.15	2,344
Car efficiency meters	1,390,307	7,639 05	13,139
Total	1,989,000	10,928 57	$18,796

TABLE IX—INCREASED POWER PLANT EFFICIENCY

Item	1919 182 0 Kw.-Hr. per Barrel Fuel	1914 166 8 Kw.-Hr. per Barrel Fuel	Decrease Amount	Decrease Per Cent
Kilowatt-hours produced	11,840,000	11,840,000	....	...
Kilowatt-hours produced per barrel of fuel oil	182 0	166 8	15 2	9 11
Total barrels of fuel	65,055	70,983	5,928	8 35
Cost per barrel	$1 72	$1.72		..
Total cost of fuel	$111,894	$122,090	$10,196	8 35
Cost per kilowatt-hour	$0 00945	$0 01031	$0 00086	8.35

family doctor. Therefore, it has been necessary to consult a specialist to prescribe the remedy. In this case, the specialist is the Railroad Commission of the State of California. There is nothing to indicate that the San Diego Electric Railway is financially weak, but it is incapable of continuing to maintain its normal strength at present, due to the lack of proper nourishment.

The railway assumed that it had reached during 1913 a stage of development in which the revenue received from its transportation business was sufficient to pay necessary operating expenses, set aside a depreciation reserve, pay taxes and earn 6.5 per cent return on the physical value (book value) which amounted to $3,740,000, as of Dec. 31, 1917. The company considered that it had reached a point determining the soundness of its investment (which conclusions were drawn at that time from the books), and that the promised prosperous future dreamed of by its investors for many years was at hand, but out of a clear sky appeared the following combinations which could not be foreseen and which were entirely beyond the control of the management: (1) The freeze, (2) hard times due to freeze, (3) jitney competition, (4) enormous increase in private automobiles, (5) decreased tourist travel due to war, (6) flood of 1916, (7) increased taxation, and (8) increased operating expenses due to war.

All of these facts had a tendency to raise the cost of manufacturing transportation while there was no corresponding increase in the price paid for the commodity.

The public utility regulations do not permit the railway to earn a sufficient surplus during good times to take care of the poor years. Therefore, when costs go up, rates should likewise go up. The car riders should bear in mind that the relief now asked for should have been requested at a much earlier date.

In an appendix, Mr. Burns gives an extended story of the history and organization of the San Diego Electric Railway.

Cost of Labor Turnover

According to figures cited by the Training Service, Department of Labor, the cost to American manufacturers of preventable labor turnover is $1,250,000,000 a year. Magnus W. Alexander, a recognized authority, is quoted by officials of the service as estimating the cost of hiring a man at from $10 to $200, and the average charge against the employer on this account as more than $50. The number of workers in the United States is reported to be 40,000,000, of whom one-fourth are in the manufacturing industries. On the basis of a turnover of 250 per cent for the nation at large, the number of hirings in the manufacturing industries alone would be 25,000,000 a year, and at $50 each the cost would be $1,250,000,000. A complete elimination of labor turnover would mean the saving of this great sum.

The Detroit (Mich.) United Railway is overhauling and painting from 95 to 125 cars per month. This means that the paint shop force is working on about forty cars at a time. The work will be continued until all rolling stock is in first-class condition.

Portable Stone Crusher Saves Cost Every Year

Omaha Company Crushes 935 Cu.Yd. of Stone in a Period of Six Months at an Actual Saving of $1,500

THE Omaha & Council Bluffs Street Railway, Omaha, Neb., has for the past five years been using in its maintenance-of-way department a portable stone crusher manufactured by the Universal Crusher Company, Cedar Rapids, Iowa. This equipment has been used to crush vitrified brick, old concrete, and other materials formerly considered of no value and hauled to the dump.

Several years ago the railway company was obliged to lay 1 mile of double track in a street already paved with brick. All of the brick removed during the construction, a total of 2,300 cu.yd., was run through the crusher on the job at an average rate of 60 cu.yd. per ten-hour day with a force of ten or eleven men. The crushed brick was used as a coarse aggregate for the new concrete and also as ballast. As ballast the brick has given excellent service during the past four years. During the first six months of 1918 the Omaha Company crushed 935 cu.yd. of material at a cost of 72 cents per cubic yard in place, while at the same time crushed stone in the pile cost about $2.32 per cubic yard. This represents a saving of approximately $1,500. The original cost of the machine was $1,200, so that the outfit has paid for itself many times over since purchased. The average amount of material crushed per year at Omaha is 1,200 cu.yd.

OLD CONCRETE SALVAGED BY PORTABLE STONE CRUSHER AT OMAHA

In Omaha old concrete, brick, etc., when not required for immediate use, is stacked at the yards, and during the winter months when the men have little else to do these materials are crushed. The accompanying photograph shows four men crushing old concrete at the yards. Two men shovel the material from the ground, one is stationed on the platform, and the fourth man, who is the motorman of the work car, acts also as supervisor of the crushing. In the photograph crushed concrete is shown in the process of being elevated to the work car and transferred to another location.

Determining the Characteristics of Metallic-Electrode Arc Welds

By Testing and Inspection of Welds a Reliable Indication of Their Soundness May Be Obtained

By O. S. ESCHOLZ
Research Engineer Westinghouse Electric & Manufacturing Company

THE four factors which determine the physical characteristics of metallic-electrode arc welds are fusion, slag content, porosity and crystal structure. Some of the other important methods that have been suggested and used for indicating these characteristics are:

1. Examination of the weld by visual means to determine: (a) Finish of the surface as an index to workmanship, (b) Length of deposits, which indicates the frequency of breaking arc and, therefore, the ability to control the arc. (c) Uniformity of the deposits, as an indication of the faithfulness with which the filler metal has been placed in position. (d) Fusion of the deposited metal to the bottom of the weld scarf as shown by the appearance of the under side of the welded joint. (e) Predominance of surface porosity and slag.
2. Chipping the edges of the deposited layers with a cold chisel or calking tool to determine the relative adhesion of deposit.
3. Penetration tests to indicate the linked, unfused zones, the slag pockets and the porosity by: (a) X-ray penetration. (b) Rate of gas penetration. (c) Rate of liquid penetration.
4. Electrical tests, showing variations, due to incomplete fusion, slag inclusions and porosity in: (a) Electrical conductivity. (b) Magnetic induction.

These tests if used to the best advantage would involve their application to each layer of deposited metal as well as to the finished weld. This, except in unusual instances, would not be required by commercial practice in which a prescribed welding process is carried out.

Of the above methods the visual examination is of more importance than is generally admitted. Together with it the chipping and calking tests are particularly useful. The latter test serves to indicate gross neglect by the operator of the cardinal welding principles, because only a very poor joint will respond to the tests.

PENETRATION TESTS MOST RELIABLE

The most reliable indication of the soundness of the weld is afforded by the penetration tests. Obviously the presence of unfused oxide surfaces, slag deposits and blowholes will result in a varying degree of penetration. Excellent results in the testing of small samples are made possible by the use of the X-ray. However, due to the nature of the apparatus the amount of time required, and the difficulty of manipulating the apparatus and interpreting the results, it can hardly be considered at the present time as a successful means to be used on large-scale production.

The rate at which hydrogen or air leaks through a joint from pressure above atmospheric to atmospheric, or from atmospheric to partial vacuum can readily be determined. The equipment, however, would be quite cumbersome, and the slight advantage in time reduction over liquid penetration is not of sufficient importance to warrant consideration for most welds.

Of the various liquids that may be applied kerosene has marked advantages, due to its availability, low volatility and high surface tension. Sprayed on a weld surface kerosene is rapidly drawn into any capillaries produced by incomplete fusion between deposited metal and weld scarf, or between succeeding deposits, slag inclusions, gas pockets, etc., penetrating through the weld and showing the existence of an unsatisfactory structure by a stain on the emerging side. A bright red stain can be produced by dissolving suitable oil dyes in the kerosene. By means of this test the presence of faults has been indicated that could not be detected with hydraulic pressure or other methods. By kerosene penetration a sequence of imperfect structures linked

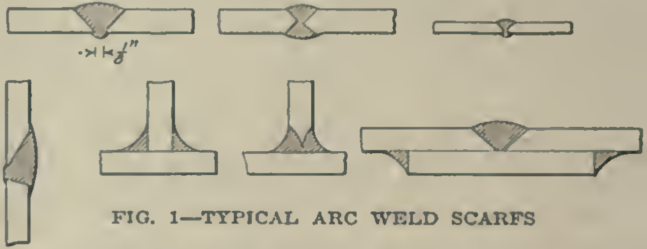


FIG. 1—TYPICAL ARC WELD SCARFS

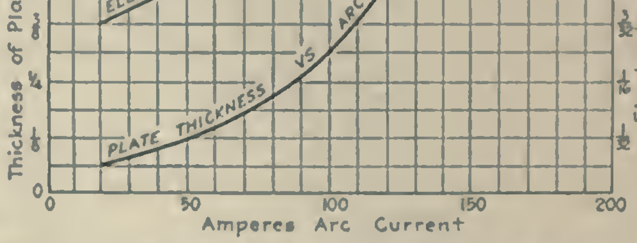


FIG. 2—APPROXIMATE ARC CURRENT AND ELECTRODE DIAMETERS FOR WELDING STEEL PLATE OF VARIOUS THICKNESS

through the weld, which presents the greatest hazard in welded joints, could be immediately located. This method, however, is not applicable to the detection of isolated slag or gas pockets, nor of small disconnected unfused areas, but a weld may contain a considerable number of distributed small imperfections, without affecting its characteristics to a great extent.

If a bad fault is betrayed by the kerosene test it is advisable to burn out the metal with a carbon arc before rewelding under proper supervision. By the means of sand blast, steam, gasoline, etc., large quantities of kerosene are preferably removed. No difficulty, however, has been encountered on welding over a thin film of the liquid.

Electrical test methods by which the homogeneity of welds is determined are still in the evolutionary stages. Some of the difficulties to be overcome are the elimination of the effect of contact differences, the influence of neighboring paths and fields, and the lack of practicable, portable instruments of sufficient sensitiveness for the detection of slight variations in conductivity or magnetic field intensity. No simple tests are possible, except thost which involve subjecting the metal to excessive stresses, for determining the crystal structure. Control of this phase must be determined by the experience obtained from following a prescribed process.

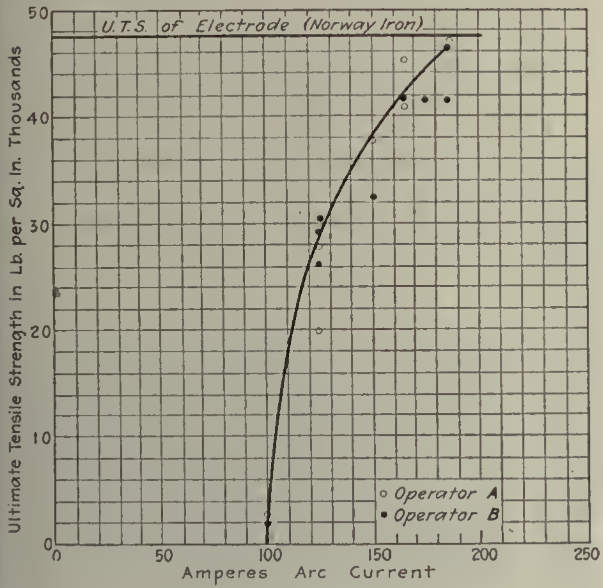


FIG. 3—VARIATION IN WELD STRENGTH WITH CHANGE IN ARC CURRENT

CARDINAL STEPS IN ARC WELDING

In common with all other operations, metallic-electrode arc welding is readily susceptible to analysis. Regardless of the metal welded with the arc, the cardinal steps are: (1) Preparation of weld. (2) Electrode selection. (3) Arc current adjustment. (4) Arc length maintenance. (5) Heat treatment.

Sufficient scarfing is involved in the preparation of the weld, as well as the separation of the weld slants, so that the entire surface is accessible to the operator with a minimum amount of filling. When necessary to avoid distortion and internal stresses due to unequal expansion and contraction strains, the metal is preheated or placed so as to permit the necessary movement to occur. Various types of scarfs in common use are shown in Fig. 1.

The electrode selection is determined by the mass, thickness and constitution of the material to be welded. An electrode free from impurities and containing about 17 per cent carbon and 5 per cent manganese has been found generally satisfactory for welding low and high carbon, as well as alloy steels. This electrode can also be used for cast-iron and malleable-iron welding, although more dependable results can be obtained by brazing, using a copper-aluminum-iron alloy electrode with the aid of some simple flux. Successful results are obtained by brazing copper and brass with this electrode. The diameter of the electrode should be chosen with reference to the arc current used.

Many concerns have attempted welding with too low a value of arc current, and the result has been a poorly fused deposit. This is due largely to the overheating characteristics of most electrode holders which lead the operator to conclude that the current used is excessive.

The approximate values of arc current to be used for given thicknesses of mild steel plate, as well as the electrode diameter for a given arc current may be taken from the curve in Fig. 2. The variation in the strength of welded joints 1 in. square with the strength of welding current is shown in Fig. 3.

Notwithstanding that electrode development is still in its infancy, the electrodes available are giving quite satisfactory results. However, considerable strides can yet be made (with its further evolution) in the ductility of welds, consistency in results, as well as in the ease of utilizing the process. A short arc is usually maintained by a skillful operator, as the work is thereby expedited, less electrode material is wasted, and a better weld is obtained due to improved fusion and to decreased slag content and porosity. On observing the arc current and arc voltage by meter deflection or from the trace of recording instruments the inspector has a continual record of the most important factors which affect weld strength, ductility, fusion, porosity, etc. The use of a fixed series resistance and an automatic time lag reset switch across the arc definitely fixes both the arc current and the arc voltage, and thus places these important factors entirely beyond the control of the welder.

HEAT TREATMENT IS DESIRABLE

The method of placing the deposited layers plays an important part on the internal strains and distortion obtained on contraction. It is possible that part of these strains could be relieved by preheating and annealing, as well as by the allowance made in preparation for the movement of the metal.

The heat treatment of a completed weld is not a necessity, particularly if it has been preheated for preparation and then subjected to partial annealing. A uniform annealing of the structure is desirable, even in the welding of the small sections of alloy and high carbon steels, if it is to be machined or subjected to heavy vibratory stresses.

The inspector, in addition to applying the above tests to the completed joint and effectively supervising the process, can readily assure himself of the competency of any operator by submitting sample welds to ductility and tensile tests or by simply observing the surface exposed on cutting through the fused zone, grinding its face and etching with a solution of one part concentrated nitric acid in ten parts water.

It is confidently assumed, in view of the many resources at the disposal of the welding inspector, that this method of obtaining joints will rapidly attain successful recognition as a dependable operation to be used in structural engineering.

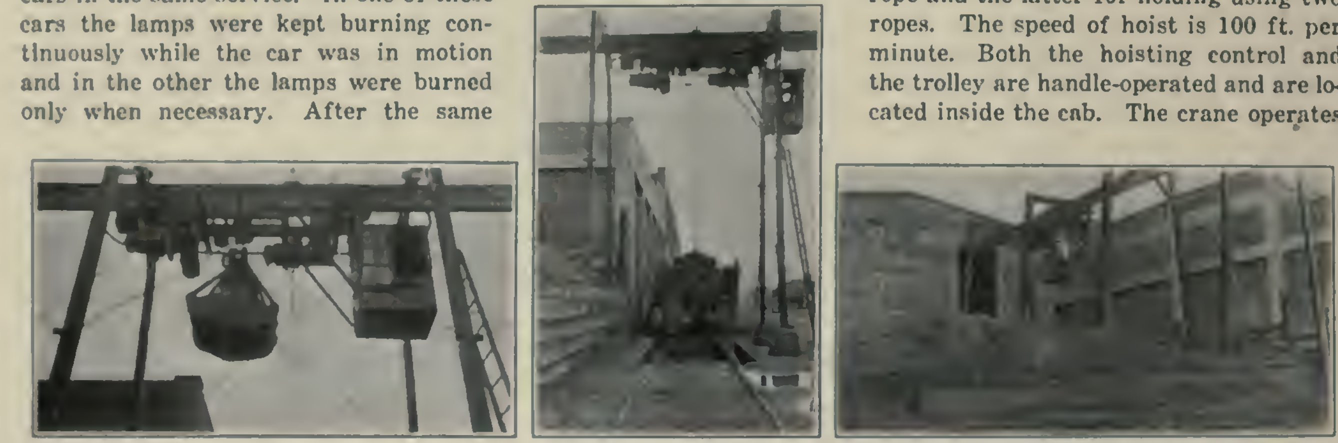
Maintenance of Car Lamps

By Otto Gottschalk
Master Mechanic Richmond Light & Railroad Company, New Brighton, N. Y.

THE maintenance repairs to car-lighting systems consist chiefly of lamp replacements, socket inspections and inspection and adjustment of switches. One of the greatest sources of trouble is the breakage of lamp filaments. The life of tungsten lamp filaments in car service, where they are subjected to severe vibration, is greatest when they are kept burning continuously. Tungsten metal when hot and soft can be subjected to a severe vibration and not become broken. When cold, however, it is very brittle.

I made an investigation and some tests in this connection by keeping a record of lamp replacements in two cars in the same service. In one of these cars the lamps were kept burning continuously while the car was in motion and in the other the lamps were burned only when necessary. After the same length of service it was found that the car which had the lamps burning intermittently developed five cases of broken filaments which resulted in two of the lamp circuits becoming inoperative. In three of the defective lamps the broken filaments had become welded together and so had short-circuited a portion of the remaining sections of filament.

This caused a larger current to flow through the remaining lamps due to the decreased resistance of the circuits and so tended to decrease their life and cause additional trouble and necessitate more lamp replacements. The cars which had the lamps burning continuously did not develop any cases of broken filament. The cost of the additional energy used by the car on which the lamps were burned continuously was 31 per cent less than that of replacing the five lamps with broken filaments. The cost of the extra energy used due to the short-circuiting of the welded filament and the reduction in life of lamps in the circuit where short-circuited filaments were found were not included in the estimate.


AT LEFT, MONORAIL CRANE USED FOR HANDLING COAL AT DETROIT CAR SHOPS. IN CENTER, UNLOADING TRACK AND PIT WHERE COAL IS PICKED UP BY CRANE. AT RIGHT, MONORAIL CRANE RUNWAY AND OUTSIDE COAL STORAGE PILE

Coal Handling for a Shop Power Plant

Detroit United Railway Installs a Monorail Crane to Handle the Coal Supply for a 1000-hp. Boiler Capacity

AT HIGHLAND PARK the Detroit (Mich.) United Railway operates one of the most complete car shop layouts in the country. The furnishing of heat and steam power for these shops requires the use of four boilers each of 250-hp. capacity. These are of B. & W. make and equipped with Detroit stokers. These boilers consume about 12 tons of coal per day and, as at present a storage capacity of only about 9 tons for each battery of two boilers is available in the boiler room, coal has to be continuously handled from an outside pile. This has a capacity of twenty carloads.

For the handling of this coal the company purchased and placed in operation about Dec. 1, a Sprague-General Electric GB-11 monorail crane equipped with a $\frac{1}{2}$-cu.yd. Hayward type-E grab bucket. The crane is capable of lifting a maximum load of 2780 lb. and the height of lift is 25 ft. There are two 6-hp. trolley motors operating at 550 volts direct current and the trolley speed is 350 ft. per minute. The hoisting motors are type M-3, 9 hp. and 6 hp., the former for hoisting using one rope and the latter for holding using two ropes. The speed of hoist is 100 ft. per minute. Both the hoisting control and the trolley are handle-operated and are located inside the cab. The crane operates on an 18-in. I-beam runway with a trolley on each side, and the closed cage in which the operator rides is attached to the truck frame. The net weight without the bucket is 5000 lb., the bucket weighs 2100 lb. and the total shipping weight is 8500 lb.

At present coal cars are handled direct from the steam railroads to the pit shown in one of the illustrations. If the boiler hoppers are, at the time of unloading, partly empty, they are filled by the crane direct from the car and the remainder of the coal is unloaded onto the storage pile. The coal in the bottom of the car, not reached by the bucket is dumped into the pit from which it is picked up by the crane. The crane enters the building on a runway through double swinging doors, the front and rear ends of the truck being equipped with bumpers which strike the doors on steel plates. The runway extends over the hoppers of both batteries of boilers and dumping is effected without any lowering of the bucket.

At present ashes are handled by hand but an endless conveyor is now being installed. The ashes will fall from the stokers onto this and they will be conveyed to a pit just inside the doorway through which the crane enters the building. After this installation is completed the crane, when filling the hoppers from the outside storage pile, will pick up a load of ashes on the return trip and deposit them in a car standing over the unloading pit. Thus the two operations will be accomplished with practically no extra horizontal motion and the crane will be given work for a large part of the day.

Zinc Chloride Versus Creosote for Treating Ties

THE American Wood Preservers' Association met in St. Louis last week and elected the following officers: J. B. Card, president; A. R. Joyce, first vice-president; C. Marshall Taylor, second vice-president; F. J. Angier, secretary-treasurer.

An entire session of the convention was devoted to a discussion of the available supply of chemicals for the preservation of ties and other railroad timbers. Reports from manufacturers of creosote were not at all encouraging as to the present outlook for this material. As a result of the shortage in the creosote oil supply, there has been a notable transition from the use of creosote to zinc chloride in the treatment of ties. While this latter material will not preserve timber as effectively as creosote, nevertheless it increases the life of the ties from two to three times that of the untreated wood.

In this connection it is interesting to note that in the tests of roadbed leakage resistance conducted by the United States Bureau of Standards and described by E. R. Shepard in the ELECTRIC RAILWAY JOURNAL of Jan. 25, it was found that ties treated with zinc chloride showed a very low electrical resistance. Also in the 1916 report of the committee on way matters of the A. E. R. E. A. it was stated that the experience of several electric railway companies indicated that zinc chloride increases the conductivity of timber and in many instances has given impetus to the corrosion of spikes and the rail base. This experience was deemed sufficient reason to make the consideration of zinc chloride as a preservative in the electric railway field undesirable.

Best Way of Stacking Ties

IN DISCUSSING methods of stacking ties at the January meeting of the American Wood Preservers' Association it was stated that the 1 x 9 method of stacking ties in a yard was the best because it allows plenty of air to circulate through the piles, and as this method of piling provides stacks of ten, counting is made very easy whenever that becomes necessary. The 1 x 9 method consists of laying one tie crosswise at the edge of the pile with nine ties on top of this laid lengthwise.

The advantages of the 1 x 9 method over the 2 x 8 method are that with the latter the ties will lie absolutely flat whereas with the former the ties are sloped and thereby give the water a chance to run off and so insure the ties being kept dry and being subject to little danger of decay.

Impulse Gap Lightning Arrester Is Sensitive to High Frequency Discharges

AT THE 1918 convention of the A. I. E. E., C. T. Allcutt of the Westinghouse Electric & Manufacturing Company discussed a new form of spark gap for lightning arresters to which the term "impulse protective gap" was applied. Since that meeting considerable progress has been made by the company with this device. Its principle is shown in Fig. 1 and the actual set-up of the apparatus is as shown in Fig. 2. The principle of the apparatus is that when two gaps, shunted with unlike impedances, are connected in series one of the gaps will break down more readily than the other when high-frequency impulses are received by them. In practice the equipment includes standard porcelain insulators (two of which are used as condensers), an unbalancing resistor, an auxiliary electrode or "tickler," a sphere gap, an auxiliary horn gap, a short-circuiting clip, a charge-and-discharge resistor, and a supporting framework. The framework is equipped with feet which can be mounted upon an existing structure.

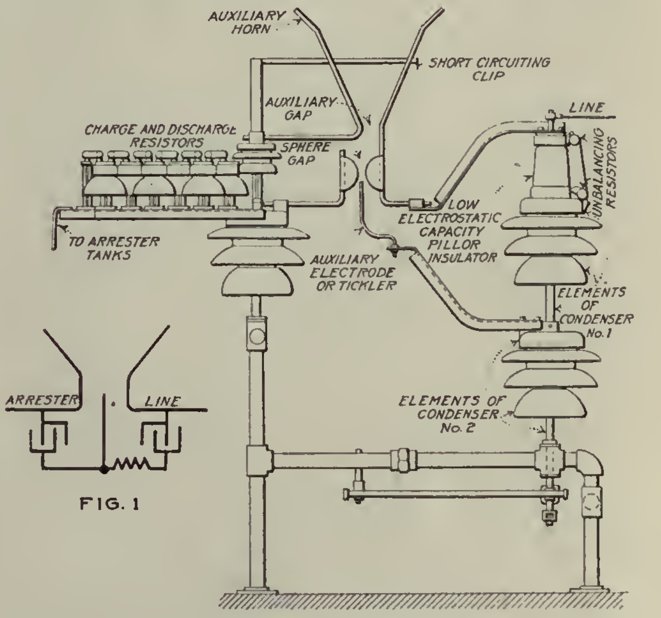

AUXILIARY HORN
SHORT CIRCUITING CLIP
AUXILIARY GAP
LINE
CHARGE AND DISCHARGE RESISTORS
SPHERE GAP
UNBALANCING RESISTORS
LOW ELECTROSTATIC CAPACITY PILLOR INSULATOR
TO ARRESTER TANKS
AUXILIARY ELECTRODE OR TICKLER
ELEMENTS OF CONDENSER No. 1
ARRESTER
LINE
ELEMENTS OF CONDENSER No. 2

FIG. 1

FIG. 2

FIG. 1—SIMPLIFIED DIAGRAM OF IMPULSE GAP ARRESTER. FIG. 2—ACTUAL SET-UP OF APPARATUS

In action the high frequency discharges start from the auxiliary electrode and have but one-half of the gap to jump. This electrode is so shaped that although the gap is one-half the main gap the breakdown voltage is only about one-fourth as great. One important claim for the new type of arrester is the speed at which the arrester operates due to the shorter time needed to build up the field.

A misprint occurred in one of the formulae published with Norman Litchfield's article on page 287 of the issue of the ELECTRIC RAILWAY JOURNAL for Aug. 17, 1918. This formula was for the downward force at the front plate of a truck caused by the turning movement of a couple and should read $P = 0.2625\ (BW/CL) \times 4$. The figure "4" was omitted previously.

American Association News

Committee Activity Is Revived by the Appointment of Thirteen Committees—Program for the Midyear Meeting Is Announced—Company Sections Resume Sessions after a War Lapse

American Committees Announced

Three New Committees Chosen for National Relations, Readjustment and Zone Systems

PRESIDENT PARDEE of the American Electric Railway Association has announced the appointment of various committees for the coming year. The list includes three new committees—on national relations, on readjustment and on zone systems. The first one will take over the work of the committee on federal relations.

The committee on the award of the A. N. Brady Medal will not be announced until it is decided whether this competition, which is conducted under the auspices of the American Museum of Safety, will be resumed. It was discontinued last year because of the war.

The committee to award the company section medal will be announced later, as will the committee on compensation for carrying United States mail, the convention committee and the transportation committee.

The committees as they now stand consist of the following:

"Aera" Advisory—H. C. Donecker, chairman, Newark, N. J.; B. I. Budd, Chicago, Ill.; Thomas Finigan, Chicago, Ill.; F. W. Hild, Denver, Col.; C. C. Peirce, Boston, Mass.; Daniel W. Smith, Detroit, Mich.; T. S. Wheelwright, Richmond, Va.

Company Membership—Richard McCulloch, chairman, St. Louis, Mo.; F. R. Coates, Toledo, Ohio; J. E. Gibson, Kansas City, Mo.; J. C. McQuiston, East Pittsburgh, Pa.; C. B. Keyes, New York, N. Y.; A. Pizzini, New York, N. Y.

Company Sections and Individual Membership—Martin Schrieber, chairman, Newark, N. J.; W. J. Flickinger, New Haven, Conn.; H. Friede, Toledo, Ohio; Prof. H. H. Norris, New York, N. Y.; Charles E. Redfern, Providence, R. I.

Constitution and By-Laws—Harlow C. Clark, chairman, New York, N. Y.; R. I. Todd, Indianapolis, Ind.; T. A. Cross, Baltimore, Md.

Education—Prof. H. H. Norris, chairman, New York City; Prof. A. M. Buck, New York, N. Y.; Prof. D. D. Ewing, Lafayette, Ind.; Prof. W. L. Robb, Troy N. Y.; Martin Schreiber, Newark, N. J.

Electrolysis—Calvert Townley, chairman, New York, N. Y.; L. D. H. Gilmour, Newark, N. J.; R. P. Stevens, Youngstown, Ohio; J. E. Woodbridge, San Francisco, Cal.

Libraries—L. A. Armistead, chairman, Boston, Mass.; I. A. May, New Haven, Conn.; C. C. Mullen, Pittsburgh, Pa.; R. H. Johnston, Washington, D. C.; C. W. Stocks, Boston, Mass.

National Relations—P. H. Gadsden, chairman, Charleston, S. C.; H. G. Bradlee, Boston, Mass.; Arthur W. Brady, Anderson, Ind.; Britton I. Budd, Chicago, Ill.; L. S. Storrs, New Haven, Conn.; W. V. Hill, Washington, D. C.

Readjustment—P. H. Gadsden, chairman, Charleston, S. C.; H. G. Bradlee, Boston, Mass.; H. H. Crowell, Grand Rapids, Mich.; W. A. Draper, Cincinnati, Ohio; C. L. Henry, Indianapolis, Ind.; P. J. Kealy, Kansas City, Mo.; Myles B. Lambert, East Pittsburgh, Pa.; C. C. Peirce, Boston, Mass.

Social Relations—J. D. Mortimer, chairman, Milwaukee, Wis.; Henry G. Bradlee, Boston, Mass.; E. W. Rice, Jr., Schnectady, N. Y.

Subjects—L. S. Storrs, chairman, New Haven, Conn.; M. R. Boylan, Newark, N. J.; Thomas Finigan, Chicago, Ill.; W. F. Ham, Washington, D. C.; Philip J. Kealy, Kansas City, Mo.; R. E. McDougall, Rochester, N. Y.; James H. McGraw, New York, N. Y.; F. R. Phillips, Pittsburgh, Pa.; R. P. Stevens, Youngstown, Ohio.

Valuation—Philip J. Kealy, chairman, Kansas City, Mo.; Charles E. Bailey, New York, N. Y.; W. J. Harvie, Auburn, N. Y.; Martin Schreiber, Newark, N. J.; W. H. Sawyer, Columbus, Ohio; J. N. Shannahan, Hampton, Va.; B. E. Tilton, Syracuse, N. Y.

Zone Systems—W. H. Sawyer, chairman, Columbus, Ohio; Prof. Thomas Conway, Jr., Philadelphia, Pa.; James F. Hamilton, Rochester, N. Y.; J. H. Hanna, Washington, D. C.; L. H. Palmer, Baltimore, Md.; Prof. A. S. Richey, Worcester, Mass.; R. P. Stevens, Youngstown, Ohio; L. S. Storrs, New Haven, Conn.; C. L. S. Tingley, Philadelphia, Pa.

Program for Midyear Meeting

THE committees in charge of the program for the midyear meeting of the American Electric Railway Association, to be held in New York on March 14, have held several meetings during the past week. Several acceptances from speakers selected for the technical meetings at 29 West Thirty-ninth Street and the dinner at the Waldorf-Astoria in the evening have been received and the full program will be announced shortly. The subjects committee mentioned above, with L. S. Storrs as chairman, is in charge of the technical sessions. The membership of the dinner committee is C. R. Ellicott, chairman; Thomas W. Casey, F. W. Coen, J. J. Doyle, A. Gaboury, F. H. Gale, L. E. Gould, E. A. Maher, Jr., E. D. Kilburn, C. C. Peirce, A. E. Potter and E. F. Wickwire.

Enthusiastic Dinner Meeting of Connecticut Section

AFTER a lapse of some months the Connecticut Company Section resumed activities on the evening of Jan. 28, when 150 members and guests gathered for dinner at the Lawn Club, in New Haven. During dinner an excellent musical program, furnished by company talent was given, and some singing was done by all. As this was the annual meeting, officers were elected, the following being chosen: For president, W. P. Bristol; for vice-president, W. R. Dunham, jr.; for secretary, W. E. Jones; for treasurer, G. H. Crossen;

for director for three years, C. H. Chapman; for director for two years, J. M. Hamilton; for director for one year, A. C. Colby. The name of W. J. Flickinger was reported as that of the director ex-officio. With the exception of the directors these were re-elections as the nominating committee felt that these were warranted in view of the interruptions to the company section work last year.

President Bristol reviewed the work of the past year giving very brief sketches of the several meetings held. He made a strong plea for co-operation between the section members and the company. The membership committee reported a present enrollment of 256 in spite of the withdrawal of 110, largely on account of the war. I. A. May, comptroller The Connecticut Company, explained how the Aetna Life Insurance Company is co-operating with the railway in financing Liberty Bond subscriptions for employees, and he urged the men not to cancel their subscriptions now that the war is over. S. W. Baldwin, assistant attorney, read for the committee on resolutions memorials to three members who had died during the year. These were passed and the men present stood in impressive silence for a time as a mark of respect to the memory of the deceased members.

The first speaker on the program was John W. Colton, executive assistant. The Connecticut Company, who came to the company a few weeks ago from the city editorship of the Springfield (Mass.) *Union*, to take charge of publicity work. He gave statistics to show the need of co-operation between public and utility and said in substance: "The public is with the railway if the service is good, but not if the service is poor." The condition of the electric railways is, he said further, a large economic and civic problem which must be solved in a large way. As an example of what carmen can do to impress the public with the value of railway service he cited a case on one of the company's lines in which a conductor was missed from his accustomed place by the passengers. Inquiry developed that he had been attacked by influenza, and the passengers made up a purse of several hundred dollars to cover his extraordinary expenses.

The final speaker was Capt. L. J. Maloney, who gave a thrilling account of his own experiences on the French front. He related many details of incidents which do not get into addresses usually, and his talk was full of information as well as inspiration. He paid tribute to several men from the Connecticut Company territory who had distinguished themselves by special valor or ingenuity.

Vaudeville Program at Toledo

THREE HUNDRED AND SIXTY members and guests attended the meeting of the Toledo joint company section held on Jan. 29. The program was one of entertainment comprising selections by the joint section orchestra, a sleight-of-hand performance by a conductor in the company's employ, æsthetic dancing and two boxing bouts.

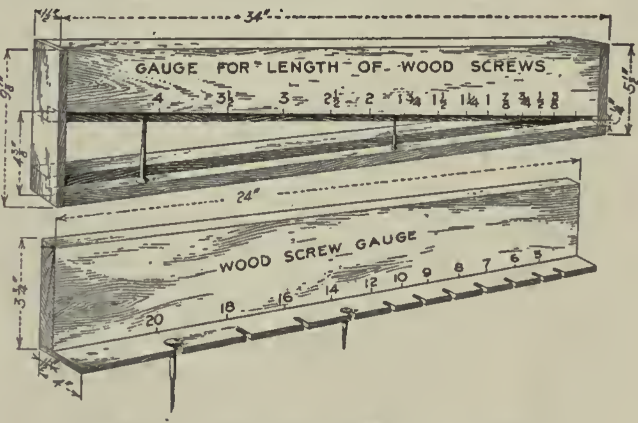
A membership campaign was inaugurated at the meeting, the present members being divided into two competitive groups. The winning side will be entertained by the other in some manner still to be determined. The monthly dance of the section, held on Jan. 15, was attended by 186 persons.

Delegate on A. I. E. E. Conference Committee

J. H. Libbey, assistant electrical engineer Bay State Street Railway, has been appointed to represent the Engineering Association at meetings of delegates of interested associations which may be called by the A. I. E. E. to consider revision of the standard specifications for the stranding of cables and thickness of insulation.

Handy Gages for Sorting Wood Screws

IN THE SHOPS of the New York State Railways, Syracuse Lines, the gages shown in the accompanying sketches are used in sorting wood screws for length and gage number. The devices are made of wood and are intended for wall mounting.



GAGES FOR USE IN SORTING WOOD SCREWS

The advantage of the tapered gage for length is that screws of nominally the same length vary quite a little in actual length. In sorting it is close enough to rate a screw as of the length corresponding to the nearest number on the gage.

Tool Steels Made in Electric Furnaces

THE Carnegie Steel Company is now making five grades of tool steel in its electric furnaces at the Duquesne Steel Works. These contain different proportions of carbon to meet different cutting requirements. The new steels are described in a pamphlet entitled "Tool Steel," which is intended for the actual tool steel user. It contains practical information without discussion of theories of heat treatment. Technical terms which are unfamiliar to many users have been omitted and in place of these reference is made to "line of hardening and minimum grain size" which are the essential points in the heat treatment of steel. Illustrations of full-sized test pieces are shown, together with a chart of heat colors and their corresponding heat-treatment temperatures. Names of colors have been selected to conform to the most general uses and are checked by indications of temperature in Centigrade and Fahrenheit degree. A chart of temper colors is reproduced by color photography from test pieces heat treated to the temperature shown. This affords a means for direct comparison by the blacksmith in the shop.

LETTER TO THE EDITORS

Commutation Tickets Would Help in Several Ways

NEW YORK CITY, Jan. 28, 1919.

To the Editors:

In connection with the discussion on fare systems, I would like to ask: "Why not compromise and use the zone system for cash fares but sell commutation tickets on the straight fare basis?" The monthly commutation tickets might be sold with two rides per day for the working people, at, say, 5 cents a ride, while to those who rode to the city outskirts and paid cash a considerably higher rate would be charged. Such a plan would eliminate the objection that zoning tends to develop the tenement district. On the other hand, the occasional, long-distance rider would be charged for the "readiness to serve" in a territory where service costs more because the travel is less. Under this plan the occasional rider buys at retail and pays accordingly a proper share of the company's overhead charges.

In many cases the electric railways cannot secure urgently needed increased revenue by increasing the fares, even if such fare increases are granted by the utility commission. If fares are advanced so far that many people will walk, the net increase in revenue is *nil*. At least such a condition would result in those cities where the climate permits all-year walking and where there is a well built-up apartment house and residence district not very far distant from the business section.

The 5-cent commutation rate would also take care of the private owners of automobiles. These automobiles transport passengers who expect to patronize the electric cars only when the weather is bad or when they are not invited to ride free. These "rainy day" patrons of the railway expect something for nothing. They expect the electric cars to pass their doors at certain times every morning but they do not expect to pay anything for this readiness to serve. Under the present system of fares, the occasional rider, such as the automobile owner, pays no more for a ride on the electric cars than does the passenger who rides regularly. The result is that the railway, being unable to forecast the weather, has to provide every day a seating capacity sufficient for maximum riding days, and this is not fair.

When service is ordered from the telephone, electric light or water companies, a deposit is first required which guarantees that the customer will pay a stipulated minimum amount each month, whether the service is used or not. The electric railway is as truly a public utility as are those mentioned, and there is no valid reason why it cannot collect a readiness to serve charge if the others are entitled to do so. This same rule of a daily commutation fare should apply to interurban service as well.

The sixty-ride commutation ticket suggested should not be good for more than thirty days; otherwise, those who ride in privately-owned automobiles may extend the use of their tickets over a longer period, say forty days, while the transportation company has provided service to take care of the patrons within the thirty days. The fare charged per ride by the commutation ticket need not be less than that charged in cash for a single short ride, but it should be considerably less than the cash charge for a long ride for the reasons already set forth.

OBSERVER.

Shop Practices of the Glasgow Corporation Tramways

AS THE Glasgow Corporation Tramways do a considerable amount of metal manufacture, American makers and users of the same classes of equipment may be interested in the proportions of the compositions which have been found satisfactory for the rather severe service and weather conditions of that city.

The standard trolley wheel is only 4 in. in diameter with ⅞-in. hub and 2⅜-in. groove, although it is used on a double-deck car weighing 24,260 lb. exclusive of sixty-two possible seated passengers, six standees and the crew. This wheel is composed of 87.75 per cent copper, 10.5 per cent tin, 1.5 per cent zinc, 0.125 per cent phosphorus and 0.125 per cent lead. Its life ranges from 12,400 to 15,600 miles, which is considerably better than the average in this country. Only two 30-hp. or two 35 to 40-hp. motors are used per car. The base tension is 16 lb.

All trolley wheels are fitted with oil-less graphite bushings which may have a life up to 9000 miles. Since this is less than the mileage of the trolley wheels, it is usually necessary to use two bushings per wheel. At the main shops, the bushings are inserted with a tinsmith's press which exerts the necessary pressure over a brass cap which protects the bushing. At the inspection depots, a hand vise serves the same purpose. The frequent American plan of inserting trolley bushings by pneumatic pressure is not possible as no compressed air is available either from air brakes on the cars or air compressors in the shops.

The harps (heads) are composed of 87 per cent copper, 8 per cent tin and 5 per cent zinc; the overhead fittings, including ears and like parts, 88 per cent copper, 10 per cent tin, 2 per cent zinc; the miscellaneous brass castings, as for car fittings, 66 per cent copper. In all cases, the bulk of the copper comes from the melting of discarded trolley wire.

Precautions for Preventing Fires in Carhouses

At a meeting of the Western Association of Electrical Inspectors held in Chicago on Jan. 28, 29 and 30, recommendations were made to the National Electric Code Committee to insure protection against fires occurring in carhouses. These recommendations were that all trolley wires inside of buildings be securely supported on insulating hangers attached to a wood troughing; that feed wires supplying current to the trolley wires have a carrying capacity sufficient for the longest track in the carhouses; that power for light, heat and stationary motors be taken from a commercial circuit where possible; that a line breaker be installed in each track trolley wire entering a carhouse, and that each track trolley wire be fed independently and be controlled by approved cutouts.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Pushing Ahead

Detroit's New Mayor Soaping the Ways for an Early Launching of Municipal Ownership

Street railway matters keep well to the front in the program of the new city administration of Detroit, Mich. It will be recalled that the new Mayor, James Couzens, devoted a considerable part of his inaugural address to the railway matter, advocating a purchase proposal. Since then Abner E. Larned has been appointed by the Mayor to the Street Railway Commission. This was followed by his election as president of the commission. Edward T. Fitzgerald has been named secretary. The commission as now constituted consists of Francis McMath, of the Canadian Bridge Company, and Col. S. D. Waldron, vice-president of the Cadillac Motor Car Company.

As Mr. Couzens views the matter it is the city's business to end as soon as possible "twenty-five years of fighting and brawling with the street railway." He says that with all due respect to engineers and their theories and opinions, "plain business methods will quickly tell you a fair valuation for the property."

In furtherance of his plans Mr. Couzens has obtained the aid of M. M. O'Shaughnessy, city engineer of San Francisco, Cal., and consultant in connection with the building of the municipal lines there, to advise him about Detroit. The Mayor knows that speed is essential. He wants the proposition of purchase to go before the voters at the election on April 5. If this is to be made possible the preliminaries must all be arranged with the railway by March 17, as the Common Council must act at least twenty days before election on any issue that is to go before the voters. In addressing the Street Railway Commission recently the Mayor said:

> I am informed, indirectly but from a reliable source, that the company will not set a price on its property, feeling that to do so might embarrass the company in case the city should start condemnation proceedings. I suggest that this commission take these appraisals, study them all; make up its mind where the differences in valuation are, and what are the fairest valuations and act on that. I am absolutely committed to the idea that the city should pay the railway nothing whatever for franchises, and nothing whatever as a "going concern." I do not know what the company's attitude on that will be, but I believe you men will agree with me when you go into the matter thoroughly.

The Mayor outlined recently the history of the various appraisals of the railway properties, stating that the Bemis appraisal set a figure of about $73,913 per mile; the Cooley appraisal fixed the value at about $102,000 a mile, and the appraisal of Barclay Parsons & Klapp was about $100,000 a mile, made on a basis of 270 miles of railway. There are now 285 miles, the Mayor explained, but it would be possible to carry out the Barclay Parsons & Klapp appraisal for 270 miles of railway, and bring it up to date, by adding a per mile percentage of valuation. The Wyandotte, Harper and Grosse Pointe lines were not included in the appraisals.

The Mayor's reference to the past has served to carry Detroiters of the older generation back to the days of Governor Pingree and Tom L. Johnson about 1899 at which time with the city on the eve of embarking on municipal ownership, the negotiations were broken off, and the ordinance permitted to die. Mr. Johnson then sold out and sought other worlds to conquer.

Some Fine Points Involved

Dispute Over Rights of Lessor to Electrify Leased Line Under a General Electrification Plan

The Legislature of the State of Washington has before it the matter of terms whereby the Chicago, Milwaukee & St. Paul Railroad will be permitted to electrify about 25 miles of line belonging to the Columbia & Puget Sound Railway, which is under a ninety-nine year lease for joint use by the Milwaukee. In the first hearing before the Senate judiciary committee, the Puget Sound won a postponement of the hearing until Jan. 30 on a condemnation bill the Milwaukee is urging.

The Milwaukee came into Seattle over the Columbia & Puget Sound line by a trackage agreement that gives the Milwaukee running rights over the Puget Sound section, between Maple Valley and Black River Junction. The Milwaukee subsequently contended it had a right to electrify this portion of the system to make it fit into the company's plan for operating by electricity west of the Rockies. The question was finally submitted to arbitration, with William H. Taft as the final arbiter. He held that the Milwaukee did not have the right to electrify the line, but added as comment that it might acquire such rights by condemnation.

The Milwaukee officials told the Senate committee that it finally decided that it could not condemn the line, and the two roads still failed to reach an agreement. The Columbia & Puget Sound Railway said that it offered to submit the question of compensation to arbitration, and that this offer was refused. It developed at the hearing that other steam roads might be affected by the legislation, and it was decided to hold a general hearing.

Overrun With Strikes

London Tubes and Suburban Lines Suspend with Grave Consequences to Metropolitan Public

Newspaper dispatches indicate that practically all Great Britain is at grips with labor. There are strikes and rumors of strikes. Under the stress of war necessities, labor had things its own way. At the close of the year signs pointed to the employers being far more at the mercy of their work people than ever they were before the war was declared.

Crises Foreseen

As the London correspondent pointed out in his letter in this paper for Feb. 1, a problem of enormous difficulty was how far the expansion of industry was compatible with steadily increasing wages and large reductions in number of hours worked a day or week. In the light of events now taking place the elastic limit of endurance seems at last to have been reached.

So far as the city transportation industry is concerned the worst stoppage of traffic is reported from London. The subway strike there began on Feb. 3, when Londoners found the entrances to the principal subway stations closed to them, owing to the midnight decision of the employees not to move trains unless a half-hour luncheon interval were allowed in their new eight-hour day.

Buses and Street Cars Going

Six tubes are reported to be affected. They are the Central London tube, which carries a heavy traffic west and east and brings many of the city workers to their businesses; the central tube artery north and south; the City & South London tube, which connects with the chief railway stations and Piccadilly; the Brompton semicircular system, which carries many thousands of travelers daily, and the Highgate and Hampstead subways, which carry traffic between the northern and northwestern suburbs and the West End district of London.

The electric system of the London, Brighton & South Coast Railway, which serves many of the important suburbs, also stopped partly on Feb. 3, and other railways with similar services were threatened with stoppage.

Buses and the street cars still were running on the afternoon of Feb. 3, but on Feb. 4 almost every bus carried a tube striker, and these tube employees were urging the girl conductresses on the buses to join the strikers.

The management of the London Underground Railways in a statement on Feb. 3 said that although the men are demanding a thirty-minute interval for meal time within the eight-hour day, the agreement made when the eight-hour day was granted provided that the eight hours should be exclusive of meal time, but that a special committee should meet on Feb. 12 to deal with any special points that might arise. The Board of Trade, of which Sir Albert Stanley, formerly head of the underground system, is chairman, issued a similar statement.

As this paper goes to press advices from London indicate a satisfactory settlement of the trouble in London. This settlement is understood to include the tubes and all the other London railway systems. Pending consideration of general conditions, the underground men will work eight hours, exclusive of mealtime.

Another Kansas City Strike Chapter

With Conditions Again Practically Normal on Kansas City Railways War Board Orders Reinstatements

An award by the War Labor Board on Jan. 31 orders the Kansas City (Mo.) Railways to restore to duty at once its striking employees under conditions prevailing before the strike, and to prosecute diligently its application for permission to increase fares, upon which increased wages previously awarded by the board were contingent. The board declared:

> It is of the utmost importance that good faith on both sides in dealings between labor and capital should be preserved. We do not hesitate, therefore, to condemn the action of the men in striking as they did, but we cannot be blind to the provoking circumstances which led them to this wrong. The attitude of the company seems to have been that it was content that the men had made the mistake of striking because it would enable them to defeat the union and to avoid the burden of increased wages.
>
> It will be observed that the submission was signed at a time when there was no prospect of ending the war. The men were induced to remain in the employ of the company with the prospect of increased wages during the period of the war. The attitude of the company toward the situation and the interest of the company seem to have changed after the armistice came. The company has announced its purpose to disregard the action of the board taken upon this application on the ground that the board has no further jurisdiction.
>
> It can and should make no difference to the board whether the company may successfully avoid performance of the award, because we have no compulsory judicial process within our control. It is our duty to proceed as if we were dealing with parties who would comply with a lawful award.
>
> Upon that hypothesis we find that the company by its conduct has prevented the performance of the conditions upon which the award was granted, that this conduct has not been in good faith, and that, therefore, the condition is to be treated as if performed and the award shall become effective as from Jan. 6, 1919, when the men offered to return to work, in accordance with our telegraphic order.

When its men walked out six weeks ago the company was left seemingly helpless. Of the 3000 men employed, 2800 left the service. Not 100 were left in the train service. Fifteen men remained in the carhouses. Only half a dozen stuck to their jobs in the shops. Only 10 per cent remained in the power house. Notwithstanding this handicap, the power for the industrial plants never ceased for an hour. Within two days railway service was resumed. Six weeks later train service was normal and shops were running at their full capacity. The track force, which quit to a man, is now doing its regular work. On Feb. 1 there were 2000 men in the train service and the shops had caught up with their work.

In considering the order of the War Board that the railway take back its former employees, the company replied:

> We do not consider that there is a strike. Many of our employees "ceased work" and we were obliged to put on new men whom we have been and are still training in their duties. They are competent, are satisfactory and we have no need for more men at present. This company will employ any of its ex-employees whose records are clear and for whom a vacancy exists. We will not discharge a single one of the present employees whose services are satisfactory, in order to make room for any of our ex-employees. But the latter will be given preference for re-employment.

In reply to the order of the War Board that the men who left the company's employ in December, be returned to work P. J. Kealy, president, issued the following under date of Feb. 3, the day such former employees were to be restored:

> The answer of the Kansas City Railways to the amended order of the War Labor Board is this:
>
> The company does not have the money to pay the increased wages recommended, it cannot obtain it, and therefore will not promise to pay it.
>
> The company cannot, without breach of contract, confidence and good faith, discharge the men employed to take the places of the striking employees, hence, cannot and will not do so.

The Amalgamated Workers met on Feb. 2 and voted to return to work and demanded that they be reinstated. The announcement quoted previously is President Kealy's ultimatum. Of the 2800 who "ceased to work" in December, 250 returned in the meantime and are permanently employed.

The four men who were arrested and confessed to having placed bombs under the cars are still in jail. They were unable to furnish bonds.

Gone, but Not Forgotten

A few years ago, says *Municipal Reference Library Notes*, published by the New York Public Library, the more important editorial offices of this country received regularly, without charge, a cleverly written little publication entitled *Concerning Municipal Ownership*. This magazine was designed for editorial use and the material was so well presented that much of it found its way into the pages of various periodicals. Needless to say, the articles, humorous stories and cartoons all preached the failure and inefficiency of municipal undertakings.

Concerning Municipal Ownership ceased to appear about three years ago and shortly thereafter was announced the formation of the Public Ownership League of America which was put forward as "a non-partisan, educational movement for the advancement of the public ownership and democratic control of public utilities and natural resources" and whose object was stated as being "to secure the efficient operation of public utilities already publicly owned; just and reasonable conditions for all public employees, and the public ownership of additional public utilities as far and as fast as it can be made practical."

The league's offices are at 1439 Unity Building, Chicago. Albert M. Todd, Kalamazoo, Mich., is president, and Carl D. Thompson is secretary.

The publication of a *News Letter* has recently been undertaken and the first issue contains many items about the progress of the municipal ownership movement. Other bulletins are in preparation.

Work, Not Talk, His Motto

Frederick P. Royce, the new general manager of the Brooklyn (N. Y.) Rapid Transit Company, on assuming the duties of his new office made the following statement:

> There is little that I can say at present that would be of interest to the patrons of the properties of which Judge Garrison has appointed me general manager. I have made only a most casual inspection of parts of the lines and know little about the power plants, the operating department and the equipment. When I know more I may have something to say, but at best I shall be a poor talker. I prefer to let my work speak for me.
>
> This much, however, I can say: I have been identified with the management of public utilities, including traction companies, for many years, and I have always found that those companies which served their patrons best paid their stockholders most. And so I have always insisted that properties with whose management I had to do should give the best service possible to the public. What "the best service possible" on these lines means, I cannot say now, but it won't take me a great while to find out. When I do, I hope to be able to help the receiver in giving that sort of service to the patrons of the B. R. T

Metropolitan District Jubilee

The Metropolitan District Railway, London England, has just completed its jubilee, the first section having been opened in October, 1868. Until the year 1905 its name was anathema owing to the foul atmosphere in the tunnels due to the steam locomotives which were employed. Since the advent of electric traction matters have been altogether different, and the line enjoys an overwhelming popularity. Running from the western suburbs through the heart of the city to the east end, and connecting with other railways, it does a huge business and the trains make almost a procession during the rush hours. Unfortunately the high capitalization prevents any dividend being paid on the ordinary shares. The original cost of construction and payments for land were enormous. One observer expresses the opinion that perhaps some day there will be a reconstruction and readjustment scheme under which some of the capital will be written off.

Making Jobs by Ordinance

Newspaper Defends One-Man Car in Editorial Which Shows Motives of Opposition

In California a bill has been introduced in the Legislature to prevent the use of one-man cars. In Spokane the local union has decreed their death. Muscatine has enacted an ordinance enforcing the use of two men on a car. More recently in Hartford, Conn., have some interests become frightened by thoughts of the return to the tintinnabulation of the bells of horse-car days. The opposition seems to be obsessed with the idea that the new cars are a labor-saving device and nothing more, introduced for war-time use, and that the war being over, the cars should now go. That the labor-saving feature is only one of many points of advantage inherent in the one-man design needs no reiteration here. This fact has not been entirely lost sight of outside the industry, either, as shown by the following extract from an editorial "Making Jobs by Ordinance" in the Marshalltown (Iowa) *Times-Republican:*

> Muscatine has an ordinance enforcing two men on street care. A street car cannot run in Muscatine without two men to handle it, under the ordinance which has just been upheld by a court and which will be carried to the Supreme Court for decision.
>
> The Council of Muscatine did the community a wrong when it passed such an ordinance. Marshalltown has had a full experience with the one-man car and approves it thoroughly. It is quite as safe as the two-man plan as the records of accidents will show by comparison. The service is excellent. The men themselves like it. There is no good reason to be given for two-man cars in Marshalltown unless somebody wants an unnecessary job. And Marshalltown is a larger and in all modesty may be said to bo a better city than Muscatine.
>
> The one-man car may be an eyesore to those who would make two jobs grow where one is entirely sufficient, but it is not to the mass of workmen and employed persons. For the one-man car permits line extensions and the operation of more cars to reach out into the outlying districts to carry more employed persons at a possible profit. Where a two-man car would lose money a one-man car may operate profitably.
>
> Extensions are the poor man's opportunity. It gives him a chance at cheaper lots that will soon be "insido property." "Inside property" means only one thing, that it is easy of access to employment or business. The street car line builds up an addition to the city. Growth is dependent upon transportation and transportation is dependent upon the possibility of transporting passengers with a profit or at least without loss.
>
> Good law is presumed to be good common sense. It is neither good law nor good sense to attempt to enforce upon a public utility the employment of unnecessary and inadvisable employees. So it is fair to presume that the Supreme Court will take a different view of the Muscatine situation than that taken by the court that has passed upon the ordinance.

A Vicious Legal Cycle

The investigation of the methods of certain attorneys in representing men charged with crimes in Cleveland, Ohio, brought out an interesting story from **John J. Stanley**, president of the Cleveland Railway, as to how a crook was made a street railway checker on the recommendation of an attorney. This attorney afterward defended the man, who was charged with pocket picking and signed his bond of $500, Mr. Stanley testified before a committee of the Bar Association.

It seems this man made it his duty to clear the way for gangs of pickpockets to work the cars and several honest conductors lost their places on complaints made by him before the management learned his character. Where a conductor sought to protect his passengers from the thieves, false charges were brought against him and he was called before the management.

Under this system the criminals became very bold and finally took to picking the pockets of the conductors. Company officials became suspicious, but the culprit learned of the fact in some way and disappeared. He was later arrested for operating on a car and an indictment was found against him, but he had never been brought to trial.

Canada Plans Construction

Sir Adam Beck of the Ontario Hydro-Electric Commission of Canada, announces that work on the proposed hydro-radial electric railway connecting Fort Erie, Ont., with Niagara Falls and Port Colborne will be started within the next few months as one of the Canadian government's post-war plans.

The route was surveyed before the war, when the municipalities passed by-laws, bonding themselves for the amount of the expenditure of the proposed line.

Another project which will be undertaken soon by the Dominion government is the construction of an electric railway between Fort Erie and Hamilton, Ont. Fort Erie is across the Niagara River from Buffalo. Plans are being made by Canadian and American interests for the construction of a vehicular bridge across the river at this point and it is proposed to run the Canadian electric lines into Buffalo via this structure.

The road between Hamilton and Fort Erie is one link in the proposed line connecting Toronto and Buffalo. The Niagara, St. Catharines & Toronto Railway line from St. Catharines to Niagara Falls, Ont., and St. Catharines to Welland and from Port Colborne to St. Catharines are parts of the Canadian Northern system taken over by the Dominion government.

By taking over the Burlington radial, the Hydro-Electric Commission is well started on its line between Toronto and Hamilton. From Hamilton to Beamsville, the Hamilton, Beamsville & Grimsby electric line runs and it is only necessary to connect up the 12.4 miles between St. Catharines and Beamsville to have the completed line between Hamilton and Niagara Falls, Ont.

Bill to Aid Connecticut Company

State aid to the extent of $2,000,000 to the Connecticut Company, which operates most of the electric railways in the State, is proposed in a bill offered in the General Assembly. The Public Utilities Commission would first give hearings to determine the need and decide on the payment of sums as required.

Labor Case Concluded

Only Presentation of Briefs Remains in Case of Washington Company Before War Labor Board

The Washington Railway & Electric Company, Washington, D. C., and its employees completed the presentation of their cases as to the few remaining issues between them at the hearing before the examiners of the National War Labor Board on Jan. 31. The attorneys will present briefs instead of making oral argument.

Former President Taft, joint chairman of the board with Basil M. Manly, expects to be away from Washington for about two weeks, and the examiners advised the parties that the award of the board would not be made earlier than Feb. 20. Meanwhile the changes in working conditions which were agreed to are to become effective at once.

The company and the men agreed that as nearly as possible, 70 per cent of the men should have straight runs, and not more than 30 per cent swing runs. The company is to welcome the co-operation of the men in framing schedules. Extra men reporting for extra work are to receive half pay until actually put to work. Motormen operating snowplows are to receive 60 cents an hour and conductors 55 cents.

Of the points left at issue the most important are: Whether the conductors are to be paid for the twenty or more minutes they spend after coming in from their runs in making out their reports and turning in their receipts; and, whether motormen operating hand-brake cars are to receive 5 cents an hour extra.

Ottawa Would Sell to City

The Ottawa (Ont.) Electric Railway has made an offer to sell to the city at a price of, in round figures, $6,500,000, and has given an option to May 1 at this price. The sale figure covers all the holdings of the company, including Britannic Park and the Rockcliffe right-of-way. The matter has been under negotiation with the Board of Control for some time and took such shape that it was decided on Jan. 30 to make an announcement.

A special meeting of the City Council has been called to authorize the board to "engage such engineering, financial or legal assistance as may be necessary to obtain a full report on the proposition submitted, obtaining the necessary legislation in connection with the purchase of the road and doing other things arising in connection with the sale."

In view of the overwhelming majority in favor of the purchase of the railway and its operation by a commission when the questions were submitted to the electors, it is expected that the City Council will approve of the recommendations.

The company's franchise expires in five years.

Canada Takes Electric Line

The Dominion government, through D. B. Hanna, president of the Canadian National Railways, has purchased the Toronto Suburban Railway system from Sir William MacKenzie, of MacKenzie & Mann, and the Royce estate. The Davenport, Crescent and Lambton lines of Toronto and the Guelph, Ont., radial are included in the deal.

President Hanna announces that the Toronto Eastern, now under construction through Bowmanville, Whitby and Oshawa, will be completed and operated for the present under the existing management. The government is willing to sell the lines within the city to the municipality, and it seems likely that the city will make the purchase in order to extend the small municipal system which has been in operation for several years.

The government took over the line on the basis of inventory cost, which is said to be substantially less than replacement cost under present conditions. It is stated that the Guelph line will be connected with a new road which will be built between Toronto and Hamilton if the federal government does not take over the Grand Trunk system.

What Patrons Should Do

In support of its application for a 6-cent fare the Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., has issued to its patrons a thirty-page pamphlet describing the various aspects of the transportation problem. For some years, it is said, transportation has been furnished at less than cost, and the public and the investor have both suffered. The present established agencies have failed so far to solve the difficulty, and communities should adopt one of the following plans:

1. Take more thoughtful interest in the local and State agencies set up to control and regulate service and rates and give them intelligent, helpful advice.
2. Appoint public directors to have absolute charge of service, rates and operation and guarantee of a fair return under these conditions on the money the private individual has invested in the service of the public.
3. Or purchase and assume as a public obligation the ownership and operation of electric railway lines.

The company's application for a fare increase was filed on Jan. 20, but the appeal to the public was made before this date. On Jan. 16 the company sent to every city official in its territory a personal letter with a copy of the pamphlet, stating also that every city attorney would receive a copy of the forthcoming petition to the commission and all the exhibits to be used.

On Jan. 18 the company issued a full-page newspaper advertisement asking the consideration of all patrons, and it distributed to them 30,000 copies of the pamphlet. This direct presentation of the company's case to the public was made because the Fort Wayne company believes that the benefits from a fare increase are minimized unless the good-will of the patrons is retained.

The company's petition to the commission asks for an increase in street railway fares from 5 cents to 6 cents in Fort Wayne, Logansport, Lafayette, Wabash and Peru, and an increase in interurban rates from 2½ cents to 2¾ cents a mile. For the last two years the company has defaulted in the payment on its $10,815,000 of 5 per cent mortgage bonds, and it has never paid a dividend on either common or preferred stock.

News Notes

Against One-Man Cars.—A bill has been introduced in the Legislature of California by labor organizations to prohibit the use of one-man cars.

Municipal Ownership Move in Hartford.—The Aldermen of Hartford, Conn., on Jan. 27 voted to ask permission from the Legislature to purchase the Hartford lines of the Connecticut Company.

Attack Spokane One-Man Cars.—The labor unions of Spokane, Wash., are demanding that the Washington Water Power Company and the Spokane & Inland Empire Railroad take off the one-man cars, contending that they are unsafe and that the service which is rendered by them is inadequate.

Wants Opinion from Attorney-General.—Senator Perrin of Norfolk, Mass., has presented in the State Senate an order requesting an opinion from the Attorney-General on the constitutionality of last year's Boston Elevated Railway service-at-cost bill. The order has since been adopted in the Senate upon recommendation of the committee on rules.

Overtime Award Announced.—The Wilmington & Philadelphia Traction Company, Wilmington, Del., has been instructed by the War Labor Board to pay time and one-quarter for hours exceeding ten in a day and to pay men working on snowplows and street sweepers time and a half after ten hours.

Milwaukee Against One-Man Cars.—Mayor D. W. Hoan, of Milwaukee, Wis., has signed the ordinance passed by the Common Council providing that the Milwaukee Electric Railway & Light Company must place two men on all its cars. The ordinance, if enforced, will automatically abolish the one-man stub service in force on a number of outlying lines.

Wage Increase on Ohio Electric Railway.—Reports from Newark, Ohio, are to the affect that the Federal War Labor Board has increased the wages of platform men on the Ohio Electric Railway. On the Newark city line the maximum will be 42 cents an hour, instead of 39 cents. Interurban men will receive a maximum of 45 cents, instead of 35 cents.

Would Require All-Steel Cars.—Steel cars for all transit lines in Brooklyn and the other boroughs of Greater New York are provided for in a bill which Senator Bernard Downing and Assemblyman Dickstein offered on Feb. 5. The bill applies to all surface, elevated and subway lines and the requirement must be effective one year after the law is signed.

New Milwaukee Wages Continue.—The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has announced that it will continue the payment of the present increased wage scale until March 15. The danger of a strike on Feb. 1 was thereby avoided. The issues involved in this case were reviewed in the ELECTRIC RAILWAY JOURNAL for Feb. 1, page 247.

Toronto Men Accept Award.—When reminded by union leaders that the wage agreement expires in June next, employees of the Toronto (Ont.) Railway concluded to accept the award of a board of conciliation under which they are granted a war bonus of 2 cents to 2½ cents an hour. The company was willing to accept the award, but the men at first were in favor of appealing.

Notice of Termination of Employment.—A bill has been introduced in the Legislature of Iowa making it mandatory for public service corporations to give employees at least ten days' notice before discharging them, or giving them written notice setting forth the reasons for the discharge. In like manner the employees are required to give ten days notice before leaving the service of their employers.

Railway Wants Bus Franchise Reviewed.—A writ of certiorari to review the action of the City Commission of Newark, N. J., in granting a fifteen-year franchise to the General Omnibus Company of New Jersey has been granted by Chief Justice Gummere in the Supreme Court upon the application of the Public Service Railway. The contention of the railway is that the franchise ordinance was adopted by the commission with an insufficient number of votes. The issuance of the writ will act as a stay against operation of the buses.

Extension of Franchise in Lakewood.—The village of Lakewood, suburb of Cleveland, Ohio, has suggested to J. J. Stanley, president of the Cleveland Railway, terms for a ten-year extension of the franchise in that municipality. Continuance of the 3-cent fare in Lakewood, maintenance of the 5-cent fare between points within Cleveland and Lakewood, with provision that the charge shall never be less than that in Cleveland, and laying tracks in the center of Clifton Boulevard, are among the terms mentioned. If the franchise is not renewed by May 1, 1919, the suburb will lose the 3-cent rates within its boundaries, and the company may charge 5 cents.

New River Tunnel Ready on April 1.—The Public Service Commission for the First District of New York is making plans for the opening of the new Clark Street tunnel line to Brooklyn about April 1. This line forms the connection between the West Side subway in Manhattan and the Interborough lines in Brooklyn. It is a two-track subway connecting with the West Side line at Chambers Street, and extending through Park Place and William Street in Manhattan to the new Interborough Rapid Transit Company East River tunnel to Brooklyn, and on the Brooklyn side through Clark and Fulton Streets to a connection with the existing line at the Borough Hall station. At present the line is in operation as far as Wall and William Streets, Manhattan.

Commission Work Can Now Proceed.—The Board of Estimate of New York City has appropriated $315,564 to cover the expenses of the Public Service Commission for the First District for February and March. This is at the yearly rate of $1,952,431, and the administration and rapid transit part of the appropriation was in accordance with the schedules presented by the commission. The commission, however, did not get the $14,246 it wanted for a new bureau to audit the operating accounts of the Brooklyn Rapid Transit Company and the Interborough Rapid Transit Company under the dual contracts. The commission wrote to the Governor recently complaining of the board's refusal to grant appropriations for rapid transit work.

Severe Flood Damage.—The heavy downpour of rain in the Puget Sound country during the week ended Jan. 29 caused thousands of dollars of damage to the electric interurban lines, railway systems, and county structures. In many places tracks were under several feet of water, bridges were washed out, and communication entirely cut off. All rail communication between Seattle and Tacoma was severed by 4 and 5 ft. of water submerging the interurban tracks near Tacoma Junction. The main line tracks between Seattle and the East were kept open, and troubles with slides in the mountains were slight. Highway traffic was completely cut off in many places by back wash cutting into the gravel approaches of bridge structures.

New Brooklyn Accident Arbitrator.—Henry W. Taft, brother of ex-President Taft, had been designated to succeed Lindley M. Garrison as the representative of the Brooklyn (N. Y.) Rapid Transit Company on the arbitration commission appointed to arbitrate the dispute between the city and the company over the payment of damage claims arising out of the Brighton line wreck on Nov. 1. The dual subway system contract provides that in the case of a disagreement in regard to items of expenditure, etc., the same may be settled by arbitration, one disinterested arbitrator to be appointed by each of the parties and one by the Chief Judge of the Court of Appeals. Since his appointment to the arbitration commission by the company Mr. Garrison has been made receiver for the company.

New Wage Demand in Des Moines.—Employees of the Des Moines (Iowa) City Railway have asked the company for a very material wage increase in a new scale submitted during the week ended Feb. 1. Increases running from 14 to 16 and 18 cents an hour for men of three months', nine months' and one year's service are demanded by the men. Emil G. Schmidt, president of the company, has told representatives of the men that their demands are matters for the United States Court and the receivers of the railway, rather than for the company. A material increase was granted the men within the past few months. Other demands made by the employees are: better heated cars, an eight-hour day and rearrangement of the schedules to allow a four-minute wait at the end of each run.

Compromise Proposed on Commission Legislation.—After the hearing at Albany, N. Y., on Feb. 5 on the public service bills a compromise measure framed to meet Republican objections is being considered. This would provide for a three-man commission in New York City, two commissioners to exercise quasi judicial and regulatory functions and the third to be known as commissioner of rapid transit construction. The bill would provide for practically complete separation of construction and regulation of rapid transit operations. In this connection it was reported on Feb. 5 that Governor Smith had sent a cable message to William Barclay Parsons, at present a major-general with the American Expeditionary Forces in France, asking him to undertake the task of completing the unfinished portions of New York City's dual subway system.

Joint Operation in New San Francisco.—The development of the residence district beyond the recently completed Twin Peaks Tunnel in San Francisco has called for additional transportation facilities, and the Municipal Railway has extended its system accordingly. About a mile of new double track is being built and arrangements have been completed with the United Railroads for joint operation of about 11,000 ft. of track. The arrangements with the United Railroads include the payment by the city of $100,000 for a half interest in 7000 ft. of track on Ocean Avenue. On this line the city will pay the company 7½ cents per car-mile for power and maintainence of track and overhead. A separate agreement covering operation on the Taravel Street line provides that the city shall reconstruct the track to grade, using the old rails and shall put in the paving, in return for which the city shall own a half interest in the tracks. The maintenance of the line is to be shared and the city is to pay for power used at the rate of 11 cents per kilowatt-hour.

Municipal Ownership Suggested as Way Out.—D. M. McIntyre, chairman of the Railway Board of the Province of Ontario, declaring that the succession of disputes between the city of Toronto and the Toronto Railway was wearing upon him, has proposed to the parties that the city take immediate steps to purchase the system, instead of waiting several years for the termination of the franchise. Counsel for the city and for the company each contended that the first step should come from the other party. The issue under discussion was the company's plea of inability, on account of war conditions, to comply with a board order of April, 1918, calling for the purchase and operation of 200 new cars on the Toronto system, before Jan. 1, 1919. When the penalty for default had reached $24,000 the company appealed to the Supreme Court without success, and thereupon returned to the Ontario Railway Board to ask for time. It was explained that efforts are being made to purchase supplies with which to build the cars in the railway company's own shops.

Programs of Meetings

National Safety Council

The National Safety Council has announced the selection of Cleveland, Ohio, as the meeting place for the next National Safety Congress, which will be held in the fall.

Central Electric Railway Association

The Central Electric Railway Association calls attention to the change in the place of its annual meeting to be held on Feb. 27 and 28. The new meeting place is the Hotel Cleveland, Cleveland, Ohio, "The Hotel on the Square." The program will be announced later.

Central Electric Railway Accountants' Association

The detail program has been announced for the thirty-third meeting of the Central Electric Railway Accountants' Association, to be held at the Hotel Anthony, Fort Wayne, Ind., on Feb. 15. The executive committee will meet at 8.30 a.m.

The regular sessions of the association will begin at the hotel at 10 a.m. Following the address of the president and the report of the executive and standing committees, C. B. Kleinhaus, auditor of the Toledo & Indiana Railroad, Toledo, Ohio, will make an address on "Where the Money Comes From."

At the afternoon session J. D. Meek, vice-president of the Electric Supply Company and president of the Simplex Account Company, Indianapolis, Ind., will make an address on "Trade Acceptances."

Financial and Corporate

B. R. T. Loses Money

Falls Back $3,595,000 in Net Income During 1918—Directors Give Reasons for Receivership

The Brooklyn (N. Y.) Rapid Transit Company for the calendar year 1918 showed a falling off of $3,595,492 in net income as compared to 1917. A total of $2,628,238 of this decrease, or more than two-thirds, was the result of operation during the second six months of the year. The accompanying detailed tables show the full effect of the higher operating expenses and fixed charges.

These figures, which are supplementary to the latest annual report of the company, published in the ELECTRIC RAILWAY JOURNAL of Oct. 26, 1918, were presented at the annual meeting of stockholders on Jan. 31. At this meeting officials presented a report on behalf of the board of directors explanatory of the receivership and the circumstances that led to the placing of the property under the protection of the court.

INCOME STATEMENT OF BROOKLYN RAPID TRANSIT COMPANY FOR CALENDAR YEARS 1917 AND 1918

	1918	1917	Change
Gross revenues	$30,982,034	$30,085,287	+ $896,747
Operating expenses	20,035,790	17,211,885	+ 2,823,905
Net operating revenue	$10,946,244	$12,873,402	—$1,927,158
Other income	414,566	406,187	+ 8,379
Total income	$11,360,810	$13,279,589	—$1,918,779
Taxes...	$2,613,750	$2,257,292	+ $356,458
Interest and rentals	7,263,244	5,942,989	+ 1,320,255
Total	$9,876,994	$8,220,281	+ $1,676,713
Net income	$1,483,816	$5,079,308	—$3,595,492

INCOME STATEMENT OF BROOKLYN RAPID TRANSIT COMPANY FOR LAST SIX MONTHS OF 1917 AND 1918

	1918	1917	Change
Gross revenues	$15,937,475	$15,461,938	+ $475,537
Operating expenses	10,691,087	8,767,103	+ 1,923,984
Net operating revenue	$5,246,388	$6,694,835	—$1,448,447
Other income	216,862	210,025	+ 6,837
Total income	$5,463,250	$6,904,860	—$1,441,610
Taxes	$1,323,210	$1,153,112	+ $170,098
Interest and rentals	4,128,524	3,111,994	+ 1,016,530
Total	$5,451,734	$4,265,106	+ $1,186,628
Net income	$11,516	$2,639,754	—$2,628,238

It was said that the company joined in the application for the appointment of a receiver because the directors felt that while the necessity for a receivership might temporarily be avoided by borrowing the amounts needed to meet the obligations now payable, the ultimate result could not be long postponed or averted unless sufficient funds were provided to carry on existing construction and equipment contracts and to complete the plans for rapid transit enlargement to which the system was committed.

The raising of these large amounts was found to be impossible under the financial conditions then prevailing, and especially in view of the general disinclination of the public to invest new capital in traction properties so long as the abnormally high costs of operation, due to the war, must be borne without a compensatory fare increase.

COMPANY SOUGHT GOVERNMENT AID

In December, the urgency becoming great, the matter of an additional loan by the War Finance Corporation was taken up informally at Washington, but information was received that in view of the policy of the War Finance Corporation to restrict the exercise of its powers following the signing of the armistice, it was not in a position to consider an application for an additional loan. Inquiries through regular banking channels made it evident that the time was not favorable either for the sale of securities or for large borrowing, and the directors therefore felt that the best interests of the properties would be subserved by permitting them to be placed under the protection of the courts.

The report recited the system of temporary financing of capital requirements conducted by the company which included large borrowing from banks and trust companies and from the constituent companies of the system. It stated that so long as the system was earning substantial profits, such temporary financing presented no serious embarrassment and in the judgment of the directors was preferable to selling long-term securities at sacrifice, but when war conditions overtook the company and net earnings were largely reduced, there was no available source of capital funds except from the United States government, and "the cash became so depleted that even moneys earned for fixed charges had to be used temporarily for capital purposes."

FLOATING INDEBTEDNESS A PROBLEM

The important problem now before the company, it was pointed out, is the provision for the floating indebtedness and for the program of improvements worked out during the last six years which in the directors' opinion are essential to adequate transportation for the community and will be a source of profit to the companies. The city's work, the report says, is not less than four years behind time. The company has expended more than $60,000,000 in performing its part of the contracts, at least half applying to facilities not yet in operation.

Rhode Island Receiver in Charge

Indications Point to Simplification of Corporate Structure as Ultimate Outcome of Receivership

The appointment by Chief Justice Tanner of the Superior Court of Frank H. Swan of the law firm of Swan & Keeney receiver of the Rhode Island Company, which operates all the electric railways of the State, was the culmination of a series of incidents pointing plainly to receivership as the ultimate fate of the company. The prediction is made that the outcome will be a reorganization along lines similar to that of the Boston & Maine Railroad, with a new parent company which will own outright the complete system.

The officers of the New York, New Haven & Hartford Railroad, which owns the entire capital stock of the Rhode Island Company and the United Traction & Electric Company, the principal lessor corporation, conferred several times before the petition was filed in the Superior Court. The federal trustees acquiesced.

The first subject of major importance to engage the attention of the receiver after his appointment was a payment of the second installment of back wages due on Feb. 1 to the employees under an amended decree of the War Labor Board. Inasmuch as the court's instructions to the receiver contained no provision for such a payment, a petition was filed by Mr. Swan in the Superior Court on Feb. 3 asking that he be allowed to make the payment. The amount due totals about $72,000 in which about 2000 employees participate. No action has yet been taken by the court.

The Rhode Island Company at the present time owes the United Traction & Electric Company $47,500, representing a part of the rental payment due on Dec. 24. Another payment of $180,000 falls due on Feb. 24.

The receivership petition was filed by John J. Orr, a contractor employed by the Rhode Island Company. It recites the facts that the company at the close of business on Jan. 29 had a cash deposit of $131,228 and the only securities owned, aside from those pledged, totaled $74,000 par and are regarded as of doubtful value.

The company has paid no dividends upon its stock since June 13, 1913. The deficit for the eleven months ended Nov. 30, 1918, was $699,628.

The total amount payable by the company each year on account of guaranteed dividends on stock was $886,364; interest on bonds was $267,280; rentals, $7,550; organization expenses, $300; total $1,161,494. The net amount payable (less interest and dividends from bonds and stocks held) amounted to $1,053,915.

Demand notes held by the New York, New Haven & Hartford Railroad total $3,746,037. This with the interest unpaid, amounting to $325,143, totals $4,071,180. Other obligations overdue and unpaid amount to $393,841 and the company will be called upon to pay before April 1, 1919, the sum of $480,212 representing State and city taxes, second and third installments of back wages due employees and rentals.

There is no intention at the present time of Mr. Swan making any changes in the directing personnel of the road.

$24,346,113 Is Minneapolis Valuation

Council Committee Accepts This Figure in Connection with Negotiations for Franchise Renewal

The committee on street railway matters and extensions of the City Council of Minneapolis, Minn., on Jan. 21 fixed the valuation of the Minneapolis Street Railway, included in the system of the Twin City Rapid Transit Company. The figure set was $24,346,113. This was the valuation determined by C. L. Pillsbury, Minneapolis consulting engineer, engaged by the city to check and revise the valuation report of City Engineer F. W. Cappelen.

The valuation was accepted in connection with the proposal for the renewal of the franchise of the company, which expires in 1923. The motion for acceptance of the Pillsbury report provided that the company be allowed a 7 per cent income on its investment. Valuations also submitted to the committee were those of the company's engineer for $30,712,101; the central franchise committee's majority report of $22,156,951, and the franchise committee's minority report of $15,470,360.

In the comparative figures submitted by Mr. Pillsbury and Mr. Cappelen the marked difference is in the "going concern value." The reports of the central franchise committee allowed nothing for this item. Mr. Cappelen placed the company's water-power leases at $491,857, while Mr. Pillsbury places them at $513,172. The central franchise committee reports allowed nothing for these items.

F. W. CAPPELEN	Jan. 1, 1916	Jan. 1, 1919
Total physical property....	$21,152,222	$37,856,032
Development costs.......	4,270,230	4,270,230
Water-power leases.......	491,857	491,857
Total value............	$25,914,309.	$42,618,119
C. L. PILLSBURY	**Jan. 1, 1916**	**Jan. 1, 1919**
Total physical property....	$21,057,292	$37,486,959
Development costs.......	2,775,649	2,775,649
Water-power leases.......	513,172	513,172
Total value............	$24,346,113	$40,775,780
COMPANY VALUATION	**Jan. 1, 1916**	**Jan. 1, 1919**
Total physical property....	$24,105,758	$43,144,005
Development costs.......	5,311,462	5,311,462
Water-power leases.......	1,294,881	1,294,881
Total value............	$30,712,101	$49,750,348

On interest during construction Mr. Cappelen allowed $2,131,554, as against Mr. Pillsbury's $1,440,742. The other reports gave a lower figure. The Pillsbury total was $24,346,113, as compared to $25,914,307 by Mr. Cappelen. The central franchise committee's majority report gives a total of $22,156,951, but provides, as the other reports do not, for a reduction of this total at the rate of $438,509 per year after Jan. 1, 1916, the basis of the report.

Under this consideration the going concern value on Jan. 1, 1918, was to be $2,411,802, and on July 1, 1923, when the company's present franchise expires under contract, the going concern value would be zero.

A 5½-cent fare was advocated by A. L. Drum, consulting engineer for the railway.

In presenting the company's valuation figures, Mr. Drum declared that the $25,914,309 valuation placed by Mr. Cappelen now would be $42,618,119 if the increased costs in material and operation were considered. The Pillsbury valuation, if given for Jan. 1, 1919, would be $40,775,780. The company's valuation of $30,712,101, as of Jan. 1, 1916, would be $49,750,348 as of Jan. 1, 1919.

A comparison of the various valuations is given in the accompanying table.

Railway Delinquent

Failure of Rhode Island Company to Pay Franchise Tax of $125,000 Referred to the Attorney General

Richard W. Jennings, general treasurer of Rhode Island, as required by law, has notified Attorney-General Herbert A. Rice of the failure of the Rhode Island Company, Providence, R. I., to pay its franchise tax. This tax approximates $125,000 and was due on Oct. 1 last. In consequence the railway is a delinquent corporation and subject to prosecution.

Attorney-General Rice, however, is extremely loathe to start proceedings against the company as insistence upon payment of the tax would probably result in bankruptcy. It is expected the Rhode Island General Assembly will take the subject under consideration soon and attempt to solve the problem. Meanwhile Mr. Rice, it is expected, will mark time.

The federal trustees of the Rhode Island Company at a meeting on Sept. 27 considered the question of paying the State tax, but it was decided to file a record of the earnings and defer payment of the tax indefinitely. On Sept. 30 the trustees again met and reaffirmed their decision of Sept. 27.

The certificate of gross earnings filed with the General Treasurer showed them to be $6,085,125, upon which a tax of 2 per cent, amounting to $121,702, became due on Oct. 1. Accrued interest at 8 per cent for the ensuing four months amounts to $3,245, making the total amount due on Jan. 1, $124,947.

General Treasurer Jennings on Jan. 8 wrote to the federal trustees of the Rhode Island Company calling attention to the fact that the tax had not been paid and asking what the company proposed to do about meeting its obligation.

Abandoned Lines Must Resume

By order of the State Public Service Commission, the Washington Water Power Company, Spokane, has resumed service on three of its lines which it desired to abandon. The commission will keep a check to determine whether the business justifies permanent service.

Corporation Counsel Geraghty told the City Council that there is no question, in his opinion, that the city could compel the railways of Spokane to live up to their franchises as to fares and service. According to Mr. Geraghty, the 5-cent fare must stand and the companies must provide service on all lines, in accordance with the terms of the franchises.

Mayor Fassett believes that the consolidation of the lines of the Washington Water Power Company and the Spokane Traction Company, operating the city lines of the Inland Empire System, is the correct solution of the problem of the financial difficulties of the companies. The Mayor said:

> I am at work on a report to be submitted to the Council which will give my ideas on the problem. Consolidation must be preliminary to any satisfactory adjustment. Data are being obtained from other cities, particularly from Cleveland where the city is represented on the board of directors of the railway. In any event what we want is the right of the city confirmed to regulate to a greater extent the operations of the companies. The city and its people have an interest in the matter and should be heard.

Receiver for Hocker Line

The Kansas City, Lawrence & Topeka Railroad, Kansas City, Mo., on Jan. 30 was placed in the hands of P. W. Goebel, president of the Commercial National Bank, Kansas City, Kan., and former president of the American Bankers' Association, as receiver, by Federal Judge Pollock. Foreclosure was asked by the Commerce Trust Company, Kansas City, Mo., acting as trustee for bondholders. The proceeding was begun when the railroad failed to pay the interest on its bonded indebtedness.

Fare Results Disappointing

Operation of the United Railways, St. Louis, Mo., city and county lines, during the fiscal year of 1918, resulted in a deficit of $1,576,125 on a valuation of $60,000,000 at 6 per cent according to a report made to the Public Service Commission of Missouri by Richard McCulloch, president of the company.

The deficit on city lines was $894,165 and on the country lines $681,959, according to the figures submitted.

A statement of results of the 6-cent fare plan for seven months also was sent to the commission. It shows that the 20 per cent increase in fare on city lines has increased revenue only 10.32 per cent. The loss in passengers has been 7.82 per cent. In addressing the commission, President McCulloch asked that body to take cognizance of the conditions, so that the revenues of the company may be adjusted to insure good service, necessary betterments, and a fair return upon the investment.

San Francisco M. O. Declines

City-Owned Lines, Without Tax and Other Comparison Charges, Have 87 Per Cent Loss in Net

The latest complete report of the Municipal Railway of San Francisco, for the two years ended June 30, 1917, shows that the net profit of $74,768 for 1916 was converted into a deficit of $103,908 for 1917. The details of this decline are shown in Table I.

The foregoing showing is made after the inclusion of certain "comparison" charges, which are used in order that the municipal line may be considered upon the same basis as privately owned lines. As a matter of fact, the Municipal Railway pays no taxes, and in some instances it pays nothing for services rendered by other departments of the municipal government.

ELIMINATION OF CERTAIN FIXED CHARGES IMPROVES SHOWING

Thus, by taking the net profit of $74,768 shown for 1916 and adding the comparison charges of $166,714 for taxes and $9,182 for legal and clerical services, the "true net profit" is shown to be $250,663. Similarly for 1917 the loss of $103,908, when combined with comparison charges of $125,576 for taxes and $9,416 for legal and clerical services, becomes a "true net profit" of $31,084.

The comparison charges decreased from a total of $175,896 in 1916 to $134,992 in 1917, but this did not affect the main showing of decline in the later period. The net result of operation still showed a falling off of $219,579 or 87 per cent.

The poorer showing in 1917 was due mostly to the decrease in passenger revenue. The total passengers decreased from 47,886,784 to 36,234,723, the loss in 5-cent fare traffic being from 39,295,429 to 29,230,644. As a result the passenger revenue fell off $500,284, while the operating expenses dropped only $285,594.

The passenger revenue per car-mile for the year ended June 30, 1916, was 30.99 cents, and per car-hour $2.6729. In the following year, however, the revenue figures dropped to 27.65 cents per car-mile and $2.5317 per car-hour. The operating expenses declined from 18.32 cents per car-mile to 18.17 cents, while per car-hour they rose from $1.5798 to $1.6637. Miscellaneous statistics are given in Table II.

TABLE I—INCOME STATEMENT OF MUNICIPAL RAILWAY OF SAN FRANCISCO FOR YEARS ENDED JUNE 30, 1916 AND 1917

		1916		1917	
Passenger revenue		$1,970,477		$1,470,193	
Miscellaneous revenue		12,327		7,717	
Total operating revenues			$1,982,804		$1,477,910
Ways and structures		$40,457		$50,977	
Equipment		77,744		69,703	
Power		258,163		211,506	
Conducting transportation		731,508		596,446	
Traffic		219		293	
General and miscellaneous		56,527		37,213	
General and miscellaneous—comparison charges		9,182		9,416	
*Depreciation, and injuries and accidents		352,075		264,727	
Total operating expenses			1,525,875		1,240,281
Net operating revenue			$456,929		$237,629
Income from municipal bonds owned			24,039		22,108
Gross income			$480,968		$259,737
Taxes (comparison charges required by charter):					
State franchise 5½ per cent on gross revenue		$103,854		$78,500	
Municipal franchise 3 per cent on passenger revenue		59,149		44,121	
Municipal car license		2,955		2,955	
Federal income tax, 1 per cent on net income		755		......	
		$166,714		$125,576	
Interest on funded debt	$259,330				
Less amount capitalized	19,844	239,486		238,069	
Total deductions			$406,200		363,645
Net profit for the year after inclusion of comparison charges			$74,768		†$103,908

*The reserve for depreciation and renewals is computed at 14 per cent of the gross operating revenues, instead of on annual percentages of physical value of the property. The rate of 14 per cent is arbitrary, being based on Chicago experience as reported by Bion J. Arnold (12 per cent) and the opinion of Delos F. Wilcox as expressed in a paper on "Elements of a Constructive Franchise Policy."

There is an added 4 per cent of the gross revenue for injuries and accidents, this percentage being based on the experience of United Railroads of San Francisco. The total reservation is thus 18 per cent of the gross operating revenues.

† Deficit

TABLE II—STATISTICAL DATA OF MUNICIPAL RAILWAY OF SAN FRANCISCO FOR YEARS ENDED JUNE 30, 1916 AND 1917

	1916			1917		
	Total Amount	Per Car-Mile	Per Car-Hour	Total Amount	Per Car-Mile	Per Car-Hour
Total passenger revenue	$1,970,477	$0.3099	$2.6729	$1,470,193	$0.2765	$2.5317
Total operating expense	$1,164,617	$0.1832	$1.5798	$966,137	$0.1817	$1.6637
Operating earnings (taxes, depreciation charter charges not deducted)	$805,860	$0.1267	$1.0931	$504,055	$0.0948	$0.8680
Ratio of earnings to passenger revenue	0.4089			0.3428		
Total taxes and charter charges	$175,896	$0.0277	$0.2386	$134,992	$0.0254	$0.2325
Ratio to passenger revenue	0.0893			0.0918		
Operating expenses, taxes and charter charges	$1,340,513	$0.2108	$1.8183	$1,101,130	$0.2071	$1.8962
Ratio to passenger revenue	0.6803			0.7490		
Depreciation	$352,075	$0.0553	$0.4776	$264,727	$0.0498	$0.4558
Ratio to passenger revenue	0.1787			0.1800		
Operating expense and depreciation	$1,516,692	$0.2385	$2.0573	$1,230,865	$0.2315	$2.1195
Operating expenses, depreciation, taxes and charter charges	$1,692,589	$0.2662	$2.2959	$1,365,857	$0.2569	$2.3520
Ratio to passenger revenue	0.8589			0.9290		
Net income from operation (after deducting depreciation, taxes, charter charges, etc.)	$277,888	$0.0437	$0.3769	$104,335	$0.0196	$0.1797
Ratio to passenger revenue	0.1410			0.0710		
Passenger car-mileage	6,358,543			5,317,269		
Passenger car-hours	717,213			580,716		
Total platform expense (37½ cents per hour, eight hours per day)	$600,297	$0.0944	$0.8143	485,851	0.0914	0.8366
Total number of cars owned	198			198		
Track owned and operated (single track)			43.59			43.44
Track owned and operated conjointly with United Railroads			1.04			1.04
Total single-track mileage operated			44.63			44.48

$3,000,000 at Once for the B. R. T.

Federal Judge Julius M. Mayer on Feb. 1 appointed former Judge E. Henry Lacombe as special master in chancery to pass upon claims against the Brooklyn (N. Y.) Rapid Transit Company and subsidiaries that are in possession of Lindley M. Garrison as receiver. In a supplemental order the court fixed March 15 as the date on which all claims must be in.

On the same day an order was signed authorizing the receiver to borrow $3,000,000 with which to meet the pressing obligations of his companies. No action was taken on the petition of the receiver to be permitted to borrow more than $16,000,000 on receiver's certificates.

Another order gave leave to the receiver to negotiate with bankers who have loans of more than $3,000,000 to the company outstanding. The receiver will pay interest as it comes due and arrange to pay the principal, the lenders to hold their collateral from sale in the meantime. This order was agreed upon after a number of lawyers representing various banks had discussed it. They objected to an order restraining their clients from putting Brooklyn Rapid Transit collateral for loans in the market without giving notice of their intention to the receiver, but were in agreement that evil effects would follow the wholesale selling of the company's securities.

The receiver said he would not pay interest and then have the collateral sold in the open market.

The matter, as finally ordered, leaves the question of loans and their collateral to adjustments between the receiver and the various creditors of the company.

Financial News Notes

Oklahoma Railway Notes Offered.—The Mississippi Valley Trust Company, St. Louis, Mo., is offering Oklahoma (Okla.) City Railways' $375,000 bond-secured 8 per cent gold notes, dated Sept. 1, 1918, due March 1, 1921.

New American City Director.—At a meeting of the American Cities Company in New Orleans, La., on Jan. 20 Lynn H. Dinkans, president of the Interstate Trust & Banking Company, New Orleans, was elected a director to succeed Walter C. Weiss, resigned.

Valuation at St. Louis to Proceed.—The Supreme Court of Missouri having decided the authority of the Public Service Commission with respect to fares, the commission announced on Jan. 27 that a valuation of the physical property of the United Railways, St. Louis, will be begun within sixty days.

Abandonment Case Heard. — The Southern New York Power & Railway Corporation's application for approval of the abandonment of the normal school line in Oneonta, N. Y., was submitted to Public Service Commissioner Cheney on Dec. 27, briefs to be filed, after which the commission will make determination.

Foreclosure Sale on Feb. 15.—Richard C. Swing, special master commissioner, will sell the property of the Cincinnati & Columbus Traction Company, Cincinnati, Ohio, at public auction at Cincinnati on Feb. 15, without regard to a minimum price. The sale will be made in accordance with the decree of foreclosure of the $600,000, 5 per cent mortgage of 1905 and the $250,000, 5 per cent mortgage of 1907.

Tax Indicates Large Gross Earnings.—The increase in electric railway business in Seattle, Wash., in the year 1918, is shown in the check for 2 per cent tax on gross earnings forwarded to the city by the Puget Sound Traction, Light & Power Company. The check was for $92,728 as compared with $72,272 for 1917, or an increase of 28 per cent. Total gross earnings on which the tax was computed were $2,312,010 in 1917, and $4,212,670 in 1918. Every line in the city showed an increase. The Fort Lawton line's gross earnings almost doubled.

Representatives of Public on Board.—At a special meeting of the Selectmen of Plymouth, Mass., recently Edward R. Belcher, Ellis W. Brewster, George B. Howland and Michael D. Welch were nominated to represent the town on the board of directors of the Brockton & Plymouth Street Railway. Each of the other towns along the line of the railway has nominated one director; the bondholders and Stone & Webster, who operate the road, will nominate one director each, and it is anticipated that these men will do their best to work out a plan by which the road may be kept in operation.

Merger Approval Refused. — Approval of the proposed merger of the Bridgeton (N. J.) Electric Company with the Electric Company of New Jersey has been refused by the Board of Public Utility Commissioners. The floating debt of the Bridgeton company, the commission decided, should be funded before any merger is effected. The commission rejected also, in part, the application of the Bridgeton company for the right to transfer 500 shares of its preferred capital stock at par to the American Railways, but authorized the transfer of 400 shares. Of the proceeds, the commission will allow $35,000 for working capital and $5,000 for construction work in progress as of Dec. 31, 1917. The American Railways also controls the Bridgeton & Millville Traction Company.

Into Hiding for the Winter.—The Portsmouth, Dover & York Street Railway, Portsmouth, N. H., has quit for the winter. The road expects to resume on April 30. Last winter the road fell a victim to snow for a spell. This winter the operation of the relentless law of economics has done just as thorough, although less spectacular, a job as was done a year ago by the physical elements. There is one untoward factor this time, however. The roads are open and the auto bus has come in. It is getting whatever traffic there is. How far the railway will be able to regain this business remains to be seen. The pessimists think it will be lost almost entirely and forever. Among the apostles of despair is the York *Transcript*. That paper said recently: "It is the opinion of a great many people that the present move is simply the beginning of the end of the road here. W. A. Meloon, the receiver, says that there is no intention of junking the road, although there has been considerable talk among the owners to that effect. When the time comes to pull up the rails and tear down the trolley wires, and sell the whole business to the junk man, it will be done. Just how near that time is we have no means of knowing."

Two Additional Columbus Directors.—In order to insure its slate of directors at the annual meeting of the stockholders of the Columbus Railway, Power & Light Company on Jan. 28, the proxy committee secured an increase of two members in the personnel of the board. The new board consists of W. C. Willard, W. A. Gill, Normon McD. Crawford, Charles L. Kurtz, D. Meade Massie, A. S. Hammond, Walter B. Beebe, Samuel Ungerleider, Emil Kiesewetter, F. R. Huntington, Harry S. Holton, B. W. Marr, E. A. Reed and Frank P. Hall. The last four are new members nominated by the proxy committee. One of them succeeds E. K. Stewart, recently resigned, and another takes the place of R. H. Platt, who was elected at the reorganization meeting on Jan. 10, but could not serve because of pressure of other interests. The other two are the additional members, making fourteen in all instead of twelve. The board is now fully in the hands of the stockholders' protective committee, which will soon pass out of existence, since its purpose has been accomplished. The board organized by the election of the following officers: President, Charles L. Kurtz; vice-president and treasurer, Norman McD. Crawford; vice-president, Samuel Ungerleider; secretary and auditor, P. V. Burington; assistant secretary and auditor, H. M. Burington; executive committee, Charles L. Kurtz, F. R. Huntington and Walter B. Beebe. Harold W. Clapp was retained as manager. On Dec. 31, 1918, the company showed a surplus balance of $247,810 as compared with $191,819 for 1917. Against the 1918 amount, however, is charged a contingent liability of $142,152 for the rebate slips issued to passengers who paid the 5-cent fare for the period during which the company disregarded the franchise rate. After a deduction for this a balance of $105,658 remained.

Electric Railway Monthly Earnings

ATLANTIC SHORE RAILWAY, SANFORD, ME.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Iocome
1m., Dec., '18	$13,371	$24,945	†$11,574	$510	†$12,084
1m., Dec., '17	12,450	23,250	†10,800	473	†11,273

CLEVELAND, PAINESVILLE & EASTERN RAILROAD, WILLOUGHBY, OHIO

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '18	$51,441	*$31,203	$20,238	$16,084	$4,154
1m., Nov., '17	41,816	*28,012	13,804	11,635	2,169
11m., Nov., '18	511,629	*339,706	171,923	136,552	35,371
11m., Nov., '17	496,163	*309,912	186,251	128,473	57,778

* Includes taxes. † Deficit. ‡ Includes non-operating income. § Includes accruals under rapid transit contracts with city, payable from future earnings.

INTERBOROUGH RAPID TRANSIT COMPANY, NEW YORK, N. Y.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec., '18	$3,782,224	*$2,567,286	$1,214,938	$1,509,382	‡§$431,887
1m., Dec., '17	3,740,927	*2,076,032	1,664,895	1,102,031	‡§768,433
6m., Dec., '18	19,953,159	*14,007,725	5,945,434	8,739,865	‡§871,850
6m., Dec., '17	19,669,015	*11,094,712	8,574,303	6,482,085	‡§3,534,231

LAKE SHORE ELECTRIC RAILWAY, CLEVELAND, OHIO

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '18	$178,818	*$139,564	$39,254	$35,917	$3,337
1m., Nov., '17	142,814	*102,922	38,892	35,149	3,743
11m., Nov., '18	1,988,688	*1,443,106	545,582	397,030	148,552
11m., Nov., '17	1,618,439	*1,103,339	515,100	381,998	133,102

Traffic and Transportation

Oshkosh Willing to Help

After Frank Description of Railway Situation, Local Public Is Trying to Give Relief

A loan of $100,000 for the purchase of fifteen new cars, relief from paving obligations and city support of a 6-cent fare application—these are the pressing needs of the electric railway situation in Oshkosh, Wis. Such an outline of the situation was presented to a group of seventy-five representative professional and business men on Jan. 10 by Raymond H. Smith, vice-president and general manager of the Eastern Wisconsin Electric Company. The local public is showing a spirit of willingness to aid the company, and steps along the lines mentioned are now being taken.

Mr. Smith analyzed the electric railway situation in a frank, clear-cut and exhaustive way. He pointed out that during the year ended Aug. 31, last, the company fell $6,201 short of meeting operating expenses on the city and interurban lines, with no allowance for depreciation. Mr. Smith emphasized strongly the interest the public should take in the property, saying that anyone is wrong who thinks that the company can rub a magic lamp and thus secure the power to continue operation at a loss and the ability to mesmerize investors. Continuing, he said:

> In the past, the public and the companies have endeavored to obtain the greatest possible advantage for their respective interests, without considering the ultimate effect upon the industry or the community. There must be a recasting of the relationship which has existed between public utilities and the communities served.
>
> The Eastern Wisconsin Electric Company fully recognizes its responsibilities, is aware of the condition of the present rolling stock and admits that the public has a right to expect adequate service in comfortable cars. The company, however, must be permitted to charge a sufficient fare to make possible the service and equipment desired by the public.
>
> The public should realize that their interest in the continued efficient operation of a public utility is such that it becomes imperative that they should recognize some responsibility for financial results. Such recognition may very properly lead to putting the credit of the public back of the utilities, when necessary, in return for the class of service demanded

According to Mr. Smith, the great needs at present are these:

> 1 That the city finance the purchase of twelve or fifteen modern city cars, under a plan whereby these cars will be loaned to the company, with an agreement on the part of the company to repay the city the purchase price of the cars, with interest, over a period of time to be agreed upon.
>
> 2 That the city relieve the company of the present obligation to pave between its tracks and 1 ft. outside
>
> 3 That the city join in the application for a 6-cent fare, to be made effective at the earliest possible date, and that it recognize the principle that adequate and dependable service, to which the public is entitled, must be accompanied by a fare sufficient to make this possible.

As a result of the conference a committee of seven men was appointed to formulate plans of aid. The present indications are that the city authorities will furnish the relief from paving taxations and that citizens will finance the purchase of the cars. The city itself cannot legally finance the purchase of new cars.

The determination of a higher fare will in all likelihood be left to the Wisconsin Railroad Commission, before which a 6-cent application is now pending. During the hearings the city took the position that it would not object to a 6-cent fare if new cars were purchased. The city authorities, however, are still holding out for a special workingmen's rate between 6 and 7 a.m. and 6 and 7 p.m. The railway insists upon a straight 6-cent fare.

Zone System on Boston L

James F. Jackson, chairman of the board of trustees of the Boston (Mass.) Elevated Railway, announced on Feb. 4 that either late in March or early in April the trustees expect to introduce as an experiment a system of two zones, each with a 5-cent fare, the inner zone to cover territory between Boston City Hall and a distance of 2.5 to 3 miles therefrom, in place of the present flat fare of 8 cents.

The zone system to be tried resembles that proposed by Albert S. Richey in a recent report to the trustees, abstracted in these columns, with the exception that the boundary between the two zones is likely to be located nearer the business district than was suggested in the earlier studies, chiefly as a matter of operating convenience.

Professor Richey discussed the possible combinations of fares and zone boundaries necessary to produce stated revenues, and the trustees, after considering this report and also going over short reports of Peter Witt, Cleveland, decided to try the straight 5-cent fare unit instead of using odd-cent fares.

The tentative zone limits proposed include such traffic points as Harvard Square, Cambridge; Coolidge Corner, Brookline; Brighton Avenue and Commonwealth Avenue, Boston; Wellington Bridge, Fellsway; Main Street and Broadway, Somerville; Brookline Village, Egleston Square, Boston; Everett elevated terminal; Uphams Corner, Dorchester, and others. Beyond these points the fare into and out of the business center will be 10 cents. Prepayment areas may be established at some of the zone boundaries.

It is estimated that about half the entire population in the territory served by the system, all of Charlestown, Chelsea, East Boston and South Boston, will be included in the inner zone. In the meantime the 8-cent fare unit will be maintained.

Service Department Started

Dallas Railway Appeals to Its Patrons for Advice and Help in Managing Its Lines

The Dallas (Tex.) Railway has opened a service department. It is in charge of Homer Fisher, with title of assistant general manager. Mr. Fisher will receive all complaints and suggestions for the betterment of the service, and will explain all shortcomings and defects of the company.

The company will encourage the general public to visit the office of Mr. Fisher and make known all complaints and suggestions for improvements in the service. At the same time a campaign of newspaper advertising has been started to educate the public in the problems of operating a city railway system. In large display ads causes and reasons for irregular or delayed service is being set forth. In discussing the new department, Richard Meriwether, general manager said:

> We want the citizens of Dallas to feel that they can come here and make reports of any sort that will help us to improve the railway service. This department is open to receive suggestions and criticisms of all kinds. Constant courtesy and careful attention to little things is the rule to follow in giving good service. This is our aim, but we need the help of the public.
>
> It would be amazing if everything were handled to the satisfaction of the public as it is almost impossible to eliminate mistakes where so many workers are employed. We are doing our best, but the public will have to aid us by making suggestions through our service department.

One of the ads announcing the new service department follows:

Your
STREET RAILWAY
—SERVICE—

In the Street Car business we are all salesmen—we are selling Street Car rides at Five Cents each.

This Company is simply a big specialty department store, having for sale only one article—Street Car Service.

It would be amazing if all the sales were being handled to the complete satisfaction of the customers, and if some errors, some inexcusable mistakes, were not being made by some of our large army of salesmen.

It is the purpose of the Dallas Railway Company to serve in the best possible way by furnishing first-class, dependable Street Car Service at all times.

We want to please our patrons, and while we believe we do please the greater part of them, nevertheless we want to please all of them, if it is possible. We want to reduce to a minimum opportunities for reasonable criticisms. We have, therefore, established a

SERVICE DEPARTMENT

We want every citizen of Dallas to feel that they can go to this department and make reports of any sort that will help us to improve the street car service. It is open to receive suggestions and criticisms of all kinds. Constant courtesy and careful attention to little things is the rule to follow to give good service. This is our aim. We need your help. If you write your criticisms address them to Service Department, Dallas Railway Company, Room 221 Interurban Building. If you telephone just call Main 8080 and ask for the Service Department of the Street Railway.

What suggestions have you to make to-day?

DALLAS RAILWAY COMPANY
Interurban Building.

The Dallas Railway operates 86 miles of line. It is the consolidated Strickland-Hobson lines and operates under the model franchise enacted several years ago.

Fare Bill in Washington

Measure Would Insure Home Rule for Cities With Respect to Local Electric Railway Fares

The Phipps bill, introduced at the present State Legislature at Olympia, Wash., would authorize city councils to raise city railway fares above 5 cents. The present law fixes 5 cents as a maximum charge for fares, but there is some question as to whether this rule could be enforced. Tacoma, for example, authorized a 7-cent fare.

As the Phipps bill is drawn, only city councils could grant permission to increase fares. An effort is being made, however, to give the Public Service Commission, a disinterested party, authority to legalize a fare increase.

Some members of the Senate point out the possibility that a city council might be willing to increase fares where the city has an interest to promote, but might, for political reasons, refuse to give relief in other cases.

U. E. Harmon, city attorney of Tacoma, Mayor C. M. Fassett and Corporation Counsel J. M. Geraghty of Spokane, contend that municipal authorities should be authorized to grant necessary fare increases. They assert that municipalities stand closer to the people than a state commission, and would be more apt to give proper relief.

Chairman E. F. Blaine of the Public Service Commission declares that unless the commission has authority over rates, it should not be expected to control service. He pointed out that the commission, in considering demands for improved service, had to take into consideration the ability of the company to pay taxes, interest charges, wages, franchise obligations, and meet the expense of improved service. If the commission was expected to order service that would increase operating costs, the commission should have power to see that the earnings were sufficient to meet expenses.

The bill has been returned to the Senate from the public utilities committee in exactly the form in which it was presented to the committee by Don Kaiser, Spokane, attorney for the Spokane & Inland Traction Company.

Des Moines Case Being Argued

The hearing on the petition of the Des Moines (Iowa) City Railway for relief in the matter of fares was started before Judge Martin J. Wade the afternoon of Feb. 3. Practically all of the first two days were devoted to arguments by opposing counsel, and little headway was made on the case itself.

Attorneys for the city of Des Moines attempted to go back to the campaign leading up to the granting of the franchise three years ago to show that Emil G. Schmidt, president of the railway, had opposed acceptance of a franchise calling for a sliding scale of fares and had said that he preferred to take his chances with a straight 5-cent fare. Advertisements used by the company during the campaign were also introduced.

Attorney William Chamberlain, Cedar Rapids, appearing as a witness for the company told of the receipts during the past year and of the deficit of $375,000. The company's counsel also sought to show that these deficits accrued in spite of the franchise provisions that the company was guaranteed a sufficient fare to meet interest charges, operating and other expenses.

In the arguments between opposing attorneys Judge Wade finally advised both sides to confine their testimony to the terms of the franchise and not to the merits of the rate dispute and stated that he would not admit figures from either side.

There was every indication at the close of the session on Feb. 4 that the hearing would continue another day or two.

City Club Opposes Fare Increase

A protest against any increase in rates on the city rapid transit lines in New York City has been made by the committee on public service of the City Club of New York. At the same time it recognizes that war conditions have so increased the prices of labor and materials that some or all of the railway companies may not now be able to meet operating expenses and existing fixed charges with their present earnings.

It suggests the following steps as the most feasible solution not requiring constitutional changes:

(a) The companies to accept a modern franchise and agree to operate as one company, and

(b) The city to cancel paving and special charges and permit the discontinuance of certain lines or portions of lines and the reduction of service on other lines.

If the companies are unwilling to accept these suggestions, the committee sees no solution to the existing difficulties except through the process of insolvency or condemnation proceedings looking toward ultimate municipal ownership of all lines, although it points out that municipal ownership does not mean municipal operation, but as the city must have the power to operate as a last resort it recommends the following:

> The constitutional and statutory changes necessary to enable the city to condemn, own and operate, if necessary, all types of transit lines.
>
> The necessary legal steps to enable the city to issue income bonds as a first lien against the net revenue of the lines which it may acquire.
>
> Steps to procure legislation permitting the city to operate surface lines in the same manner it now has the power to operate rapid transit lines.

The members of the committee on public service of the club are Henry C. Wright, Delos F. Wilcox, John P. Fox, Harry G. Friedman, Charles V. Halley, Jr., and Milton B. Ignatius.

The recommendations of the committee were embodied in a letter sent to Mayor Hylan and the Board of Estimate of New York City.

Fare Increases in 348 Cities

176 Cities of More Than 25,000 Population Are Paying More—Only Six States Unrepresented

In 348 cities in the United States and Canada electric railway fares have been increased, according to the information bureau of the American Electric Railway Association. With the exception of Florida, Idaho, Kansas, Nevada, Tennessee and Wyoming every state in the Union is represented. Of the 277 cities in the country having a population of 25,000 or more, 176 are paying an increased car fare. Of the remaining 101 cities the electric railways of fifty-three are seeking relief of some sort.

Character of Fare	Where Effective	
	Cities	States
Unit fares:		
10-cent fares	27	*5
8-cent fares	18	3
7 cents, plus 1 cent for transfer	17	1
7-cent fares, with 10-cent charge for owl service	13	*2
7-cent fares	57	*19
6-cent fares	155	*34
5 cents, plus 1 cent for transfer	7	3
5 cents, with 10-cent charge for owl service	6	*5
Reduced rates eliminated	49	*22
Zone systems:		
7 and 5-cent zones, 10 cents between	1	1
6-cent zones	3	1
Two or more 5-cent zones	5	1
6-cent central, 2-cent outside zones	1	1
5-cent central, 7-cent outside zone, overlapping central zone	1	1
5-cent central, 2-cent outside zone	4	2
5-cent central zone, 3 cents per mile outside	1	1

* Includes Canada, or District of Columbia.

Twenty-seven cities in five states are now paying a 10-cent fare, the list having been swelled by the addition of the cities served by the Bay State Street Railway. Thirteen cities are operating under a zone system of some sort, the length of the zones and the amount of the fare varying greatly.

By far the greater number of increases have been from a 5-cent to a 6-cent fare, although fifty-seven cities are paying 7 cents and eighteen are paying 8 cents, sixteen more are paying 7 cents, with an additional charge of 1 cent for a transfer, and thirteen are paying the 7-cent fare, with a 10-cent charge for owl service.

The urban population of the United States is estimated at between 42,000,000 and 43,000,000, of which approximately 23,000,000, or more than half, is paying increased fares.

An analysis of the information made public by the association is contained in the accompanying table.

War Veterans Replace Women

The women conductors employed exclusively on the Kingston (Ont.) Street Railway during the war are to be relieved of their duties and replaced by war veterans. The women have been popular with the patrons of the road. They will receive ample notice of intention to dispense with their services, "or its equivalent."

Houston Voters Upheld

The City Commission of Houston, Tex., has enacted an ordinance repealing the 6-cent fare ordinance and restoring the 5-cent fare. This action was taken immediately after the Sixty-First District Court had disposed of the petition of the Houston Electric Company, seeking mandamus to compel the City Commission to permit the railway to collect 6-cent fares as provided in the city ordinance adopted last September.

Soon after the 6-cent fare ordinance was adopted, on petition from the required number of voters, the commission submitted the measure to the people, and the proposal was overwhelmingly rejected. The railway then filed suit, contending that the City Commission had no authority to delegate its rate-making powers to the people, and that the referendum election on the 6-cent fare ordinance was illegal. This case the court has just decided adversely.

The railway is now confronted with the alternatives of trying to prove to the court that the 5-cent fare is unjust and confiscatory, or of carrying its case against the action of the City Commission to the higher courts on appeal.

Transportation News Notes

Birney Cars in Portland.—The first of twenty-five Birney safety cars have been put into service by the Portland Railway, Light & Power Company, Portland, Ore.

Fare Increase in Houghton.—The Village Council of Houghton, Mich., has voted favorably on the petition of the Houghton County Traction Company to increase its fare from 5 cents to 6 cents.

Skip Stops at Dayton to Be Abandoned.—The City Commission at Dayton, Ohio, has decided to amend the skip-stop ordinance in such a way as to abolish it. The commission has received many personal requests and petitions protesting against the plan as being unsatisfactory.

Douglas Wants Seven Cents.—The Douglas Traction & Light Company, Douglas, Ariz., has filed a petition with the Corporation Commission of Arizona, asking that it be granted the privilege of increasing fares in Douglas from 5 cents to 7 cents on cash fares and to 6 cents on ticket fares.

Thirty-Ride Book Authorized.—The Public Service Commission of Illinois has authorized the Chicago & West Towns Railway, Chicago, Ill., to put in a thirty-ride ticket book, good between La Grange and regular stops East of Riverside, for bearer, to be used within one year from date, for $2.75.

Against Jitneys in Trenton.—The City Commission of Trenton, N. J., has refused to grant an application of a company to operate jitneys along the line of the Trenton & Mercer County Traction Corporation. The commissioners believed the jitney would increase the traffic congestion in the center of the city.

Presents Employees with Insurance Policies.—Each conductor and motorman employed by the Columbus, Delaware & Marion Electric Company, Columbus, Ohio, has been presented with a life insurance policy for $1,000 by the company. So long as the men are in the railway's employ the premiums on this insurance will be kept up by the company.

Wants to Use One-Man Cars.—The Middlesex & Boston Street Railway, Newtonville, Mass., has petitioned the Public Service Commission for permission to operate one-man cars on its line on Commonwealth Avenue, from Lake Street to Auburndale. The company says that it plans to equip the cars with safety devices which have been approved by the commission.

No Loading Platforms at Present.—Loading platforms, as recommended by John A. Beeler in his report on ways for improving traffic conditions in Dallas, Tex., will not be installed at once, according to M. N. Baker, supervisor of public utilities. Mr. Baker said he believed the city should solve several other traffic problems before building the loading platforms.

Says Road Is in Contempt.—The city attorney of Monroe, Mich., on Jan. 24 filed an affidavit of contempt against the Detroit, Monroe & Toledo Short Line, claiming that the company had violated the terms of an injunction issued some time ago, wherein the court sustained the contention of the city that the company could not charge more fare between Detroit and Monroe than was provided for in a Monroe city franchise.

Zone Collection Discontinued.—The Public Service Commission of Illinois has authorized the discontinuance of the zone system of collecting fares by the Peoples' Traction Company and authorizing rates on basis of 2 cents per mile between Galesburg and Abingdon. The commission has also authorized the discontinuance of commutation tickets and has directed the company to redeem the outsanding tickets. The new rates are to be in effect until Oct. 1, 1919.

Six-Cent Fare Asked at Akron.—An ordinance was introduced in the City Council of Akron, Ohio, on Jan. 27 which provides for a 6-cent fare for the city lines of the Northern Ohio Traction & Light Company. The firm which recently submitted a financial report on the situation to the City Council will be asked to have representatives at a conference on Feb. 6 to discuss the matter. Additional time has been granted to the local committee which is investigating non-essential car stops.

Inter-Company Transfers in Force.—Inter-company transfers at important intersections and points of contact of the lines of the Capital Traction Company, Washington Railway & Electric Company and Washington-Virginia Railway were issued beginning on Feb. 1. This is in accordance with the recent order of the Public Utilities Commission directing establishment of a comprehensive system of inter-company transfers between the various lines. No transfers are issued on inter-company transfers and vice versa. Inter-company transfers are issued only to persons paying a cash fare.

Express Service on Municipal Line.—The Seattle Municipal Railway has started a limited express service on the municipal railway between the northern terminus at Ballard and the central business section of the city during rush hours. Beginning at 7 o'clock, three limited cars leave the north terminus at intervals of fifteen minutes. These cars do not stop to take on or discharge passengers between the corner of Twentieth Avenue Northwest and Leary Avenue, and the corner of Third and Stewart Street. Five limited cars will be employed to care for the afternoon rush. The limited cars cut the ordinary running time of each trip about six minutes.

Metal Tokens in Baltimore.—On Feb. 1 the United Railways & Electric Company put into circulation in Baltimore a metal check which will be accepted as a 6-cent fare on all its lines, including the Blue Bus line of the Baltimore Transit Company. All paper tickets still in the hands of the public are being accepted as heretofore, but no more will be sold, nor will the paper tickets be accepted on the Blue Bus line. The metal fare checks are being sold by all conductors in reasonable quantities. They may be obtained in any quantity at the various places where paper tickets have been on sale, including general office of the company, at the department stores and newspaper offices.

Tokens of Appreciation.—Two employees of the San Diego (Cal.) Electric Railway, W. H. Barrett, inspector, and W. M. Ziegler, motorman, were conducted to the office of W. Clayton, vice-president and managing director, by M. J. Perrin, manager of transportation, recently. They were introduced with the remark by Mr. Perrin that he had been talking rules and regulations to these men for so long a period, in fact a matter of twenty years, that he considered the time ripe to bring them before the chief operating official for a hearing. The occasion for the visit, however, proved to be the presentation of solid gold Howard watches and gold monogrammed fobs, the reward for twenty years' continuous service with the San Diego Electric Railway.

Courtesy First in Brooklyn.—With a view to affording the maximum courtesy and efficiency in handling the rush-hour crowds, Lindley M. Garrison, receiver of the Brooklyn (N. Y.) Rapid Transit Company has asked Traffic Manager Dempsey to advertise for men qualified physically and temperamentally to serve as members of the special squad of platform men. This squad will be composed chiefly of ex-soldiers, thoroughly accustomed to discipline and self-restraint. An advertisement, which is to be placed in the cars of the system, will call for exceptionally tall men of unusual physical strength. Candidates accepted will be trained to qualify in cool-headedness, courtesy and intelligence in the handling of crowds, and to equip them for the exercise of firmness in quelling disturbances and suppressing the street car rowdy whenever occasion arises.

City of Toledo Appeals.—On Jan. 30 the City of Toledo, Ohio, appealed from the United States District Court (Judge J. M. Killits) to the United States Courts of Appeals at Cincinnati in the case enjoining the municipality from enforcing its franchise ordinance in which a fare rate of 3 cents was stipulated. The appeal was in the suit filed in the United States District Court against the Toledo Railway & Light Company and the city of Toledo by Henry L. Doherty & Company. The action was based on a judgment for about $84,000 obtained in a county court against the company, from which payment could not be obtained because of the restrictions placed on it by the franchise and fare-rate ordinances being enforced against the company by the city. In his injunction order, issued in August, 1918, the court restrained the city from interference with the company in the collection of fares of 5 cents and 1 cent for transfers and a 1-cent fare for children under eight years of age.

Worcester Case Presented.—The case of Worcester (Mass.) Street Railway for a 7-cent fare was started before the Public Service Commission on Feb. 4. Bentley W. Warren, representing the company, which is now charging 6 cents, presented figures to show the company was unable to pay taxes or interest without dipping into its surplus account; that it could no longer borrow from the banks and could not sell any bonds to procure funds, or even to dispose of short-time paper. Increased wages was the chief item accounting for need of greater revenue, according to Mr. Warren. He said the company earned $112,603 in 1918, which was only 1½ per cent on the stock. This amount was exclusive of a proper depreciation account. There remains $947,000 of loans and notes payable on the balance sheet, for which at present the company has no prospect of making any provision unless an increased fare is allowed. H. R. Whitney, engineer for the company, estimated the gain from a 7-cent fare for 1919 to be $405,450, allowing for a decrease in traffic of 10 per cent to 15 per cent. The hearing will be continued. The books of the company were recently thrown open to the city accountants.

Legal Notes

CALIFORNIA.—*Injury from Platform Appliance Gives Presumption of Negligence.*

Where plaintiff showed that she was injured when alighting from defendant's street car through the catching of her skirt upon a knob which served as a bumper to stop the sliding platform gate of the car, she was entitled under the doctrine of *res ipsa loquitur* to presumption of negligence. The fact that the claim agent of the company had received no report of prior accidents of this character would not be a complete defense to the charge of negligence. (Sander *vs.* Los Angeles Ry. Corp., 175 Pacific Rep., 901.)

ILLINOIS.—*Where Railway Maintains Pavement, It Can Be Sued Directly When Accident Occurs.*

Where a street railway, in consideration of its license to construct its road on the street, has agreed with the city to keep the pavement in repair, persons sustaining injury through its failure may maintain suit directly against the company to avoid circuity of action. (Fowler *vs.* Chicago Rys., 120 Northeastern Rep., 635.)

ILLINOIS.—*After Tracks Are Elevated Obligation to Pave Ceases. Lots Used for Railway Purposes Are Subject to Usual Assessments.*

The duty of a railroad company imposed by ordinance to pave streets between the tracks and for 2 ft. beyond the rails ceased when the road was elevated.

Lots owned by a railway company and used for railway purposes are subject to assessment for benefits when the streets on which they abut are paved. (Village of Oak Park *vs.* Chicago & West Towns Ry., et al., 120 Northeastern Rep., 761.)

MASSACHUSETTS.—*Company Not Responsible for Unusual Accidents.*

Where the conductor of a street car, facing to the rear, rang up a transfer, and his elbow struck the glasses of a passenger, who had risen behind him to be near the door at his stop and the glasses broke and cut the passenger's eyes, the injury was purely an accident, not avoidable by rational care required by a common carrier respecting its passengers. (Nichols *vs.* Boston Elevated Ry., 120 Northeastern Rep., 847.)

MISSISSIPPI.—*Release to One Joint Tort-Feasor Does Not Release Other Except Pro Tanto.*

A telephone lineman while engaged at work came in contact with the wire of a power company and was killed. His heirs settled with the telephone company for $7,500 and then brought a suit against the power company. Negligence of the latter being shown, the court held that the payment received from the telephone company was a release for the power company only *pro tanto* and is to be considered only as part payment for the damages adjudged by the court against the power company. (Bogdahn et al. *vs.* Pascagoula Street Ry. & Power Co., 79 Southeastern Rep., 844.)

MISSOURI.—*Duty to Pay Fare First.*

A person has no right to remain on a street car without paying his fare when asked to do so by the conductor, or to tender the fare only on condition that a transfer is to be issued, even though he is legally entitled to such transfer. (Green *vs.* United Rys. of St. Louis, 206 Southwestern Rep., 237.)

NEW YORK.—*Injury Arising Out of Employment Under Workmen's Compensation Act.*

An elevated railway guard having two hours off, who stayed on the train to ride to the office for pay and thence to a dentist, and was injured in a collision, was not within the workmen's compensation act, and could recover in a civil action. (Pierson *vs.* Interborough Rapid Transit Co., 172 New York Sup., 492.)

New Publications

The Fusibility of Coal Ash and the Determination of the Softening Temperature

By A. C. Fieldner, A. E. Hall and A. E. Field. Bulletin 129 of the United States Bureau of Mines. Washington, D. C. One copy free from the Bureau of Mines, extra copies 20 cents each from the Superintendent of Documents, Government Printing Office.

A very complete, scientific and practical treatise on the subject, containing not only the laboratory methods of procedure but also many data obtained from experiments.

Arbitration and Wage-Fixing in Australia

Research Report No. 10. National Industrial Conference Board, 15 Beacon Street, Boston, Mass. Sixty pages. Paper, $1.

This explains how state regulation of wages and of industrial disputes has become firmly established as a public policy in Australia. Australian experience, it is said, clearly establishes the value of conciliation and of some form of arbitration as a means of reducing industrial friction.

Economical Operation of Steam Turbo-Electric Stations

By C. T. Hirshfield and C. L. Kerr. Technical Paper No. 204, United States Bureau of Mines, Washington, D. C. One copy free from Bureau of Mines; extra copies

5 cents each from Superintendent of Documents, Government Printing Office, Washington, D. C.

This little pamphlet should be put into the hands of every intelligent power-plant employee. It is non-mathematical in style, and especially in these times of expensive fuel will conduce to more careful power plant operation.

The Eight-Hour Day Defined

Research Report No. 11, National Industrial Conference Board, Boston, Mass. Ten pages, 50 cents.

In this report, which is one of a series issued monthly by the board, a clear distinction is drawn between the purposes and effects of the straight eight-hour day and the basic eight-hour day. The former discourages and usually prohibits overtime; the latter allows it and even encourages it, so far as the workers are concerned. The two are therefore diametrically opposed to each other. No opinion is expressed as to what constitutes the proper number of hours for a working day.

Uniform System of Accounts for Electric Railroad Corporations

Public Service Commission for the Second District of N. Y., Albany, N. Y.

This 143-page pamphlet gives the complete text of the uniform system of accounts for electric railways which became effective on Jan. 1, 1919. The classification is an adaptation of the uniform Interstate Commerce Commission classifications, with certain modifications for use in New York. In most cases the difference lies in subdivision of the Interstate Commerce Commission accounts.

It is worthy of particular mention that depreciation accounts for way and structures, equipment, power-plant buildings and power-plant equipment are provided, and while each corporation may determine for itself the amount to be reserved annually, the commission will "necessarily, in deciding rates and other cases, have to pass upon the adequacy or the inadequacy of such charges."

In this connection the commission suggests that a depreciation charge amounting to not less than 2 per cent or more than 5 per cent per annum on the average cost of all ways and structures or to not less than 2 per cent or not more than 10 per cent per annum on the average cost of all equipment will under normal operating conditions be generally less open to question than rates which fall above or below these limits. It also suggests that depreciation rates be stated in terms of a percentage of the cost of depreciable property, since this form of statement is on the whole believed to be the clearest and simplest way of expressing the normal depreciation charge and furnishes the readiest basis for comparison between companies. It is not necessary that separate reserves shall be set up for each unit of depreciable property or even for each separate class of property owned by a corporation.

Personal Mention

J. A. Martin has been elected president of the Cheyenne (Wyo.) Electric Railway to succeed A. T. Young.

O. E. Grim has been appointed chief engineer of power station of the York (Pa.) Railways to succeed L. J. Freed.

F. M. Fritchman has been elected president of the Indiana County Street Railway, Indiana, Pa., to succeed James B. Phelan.

Sedgwick Kistler has been elected president of the Susquehanna Traction Company, Lock Haven, Pa., to succeed Jacob Scott.

G. McCabe has been appointed claim agent of the Seattle & Rainier Valley Railway, Seattle, Wash., to succeed John C. Higgins.

E. H. Derricott has been appointed secretary and treasurer of the Lethbridge (Alta.) Municipal Railway to succeed D. Donald.

Bert Gray has been appointed claim agent of the Galveston-Houston Electric Railway, Galveston, Tex., to succeed C. B. Fisher.

W. E. Pearson has been appointed auditor of the Lackawanna & Wyoming Valley Railroad, Scranton, Pa., to succeed H. E. Yost.

Harry Croyle has been appointed chief engineer of power station of the Johnstown (Pa.) Traction Company, to succeed Norris Orms.

Mary R. Armstrong has been appointed treasurer of the Susquehanna Traction Company, Lock Haven, Pa., to succeed Jacob Scott.

Paul Stark has been appointed auditor of the Eastern Wisconsin Electric Company, Sheboygan, Wis., to succeed William E. McGovern.

O. S. Lamb has been appointed superintendent of the Union Depot Bridge & Terminal Company, Kansas City, Mo., to succeed C. C. Sherk.

Emil Albe has been appointed engineer of power station of the Milwaukee Northern Railway, Cedarburg, Wis., to succeed Harry Shaver.

W. H. Bathinay has been appointed purchasing agent of the Walla Walla Valley Railway, Walla Walla, Wash., to succeed W. N. Voegtly.

W. B. Trier has been appointed assistant auditor of the Eastern Wisconsin Electric Company, Sheboygan, Wis., to succeed Simon Kurtz.

George W. Kuntz has been appointed purchasing agent of the Northwestern Pennsylvania Railway, Meadville, Pa., to succeed F. C. Yockey.

Ed Jacobs, son of the late W. B. Jacobs, the founder of the Shreveport (La.) Railways, has been elected secretary of that company.

E. A. Rochry has been appointed general superintendent of the Cairo Railway & Light Company, Cairo, Ill., to succeed W. F. Crossley.

L. Coatsworth has been appointed purchasing agent of the Chicago & Interurban Traction Company, Chicago, Ill., to succeed C. S. White.

E. E. Smith has been appointed claim agent of the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., to succeed C. R. Innis.

C. E. Gilmore has been appointed a member of the Railroad Commission of Texas, effective about Jan. 15, 1919, to succeed C. H. Hurdleston.

Harold A. Crane, who has been treasurer of the Connecticut Valley Street Railway, Greenfield, Mass., since February, 1916, has resigned.

W. H. Pickard has been appointed auditor of the Jamestown, Westfield & Northwestern Railroad, Jamestown, N. Y., to succeed A. B. Crossley.

E. W. York has been appointed chief engineer of power station of the Citizens' Traction Company, Oil City, Pa., to succeed Charles Monks.

E. B. Smith has been appointed purchasing agent of the Monongahela Valley Traction Company, Fairmont, W. Va., to succeed A. T. Watson.

M. Leahy has been appointed superintendent of overhead construction of the United Traction Company, Albany, N. Y., to succeed L. Calligan.

F. W. Potts has been appointed treasurer of the Lackawanna & Wyoming Valley Railroad, Scranton, Pa., to succeed H. C. Kochersperger.

A. C. Crandall has been appointed claim agent of the Wisconsin-Minnesota Light & Power Company, Eau Claire, Wis., to succeed J. W. Graham.

Ralph Fox has been appointed master mechanic of the Monongahela Valley Traction Company, Fairmont, W. Va., to succeed George H. Hudson.

Robert E. Williams has been appointed chairman of the State Corporation Commission of Virginia to succeed Christopher B. Garnett.

E. Watson has been appointed purchasing agent of the Reading Transit & Light Company, Reading, Pa., to succeed H. H. Reigel, resigned.

H. B. Stubblefield has been appointed purchasing agent of the Nashville Railway & Light Company, Nashville, Tenn., to succeed J. M. Davidson.

E. W. Gross has been appointed treasurer of the Seattle & Rainier Valley Railway, with headquarters at Chicago, Ill., to succeed Edgar Peck.

J. M. Luna has been appointed a member of the State Corporation Commission of New Mexico, effective Jan. 1, 1919, to succeed M. S. Groves.

C. C. Cash has succeeded E. H. Rechberger as auditor and assistant treasurer of the Northwestern Ohio Railway & Power Company, Toledo, Ohio.

C. C. Hogshead has been appointed chief engineer of power station of the Roanoke Railway & Electric Company, Roanoke, Va., to succeed E. C. Barnes.

Jesse B. Kremer has been appointed secretary and treasurer of the Shamokin & Edgewood Electric Railway, Shamokin, Pa., to succeed Manfred H. Barr.

A. E. Patterson has been appointed roadmaster of the Montreal & Southern Counties Railway, with headquarters at St. Lambert, to succeed W. H. Maxwell.

J. E. Shinn has been appointed superintendent of power of the Lehigh Valley Transit Company, Allentown, Pa., to succeed Howard H. Duff, deceased.

William Milnes has been elected vice-president of the Frankford, Tacony & Holmesburg Street Railway, Philadelphia, Pa., to succeed C. Bradford Fraley.

Winthrop Coffin, Brookline, has been nominated by Governor Coolidge of Massachusetts as a trustee of the Boston Elevated Railway to succeed Galen L. Stone, resigned.

C. S. Johnson has been appointed secretary of the Vicksburg Light & Traction Company, Vicksburg, Miss., to succeed I. C. Elston, who has been elected president of the company.

F. E. Lyons was appointed claim agent over the lines of the New York, Westchester & Boston Railroad, New York & Stamford Railway and the Westchester Street Railroad of White Plains, effective on Jan. 1.

P. H. Gadsden, president Charleston Consolidated Railway & Lighting Company, Charleston, S. C., has been appointed a member of a committee of three of the Chamber of Commerce of the United States to further the plan of a League of Nations. The other members are Edward A. Filene, Boston, and George E. Roberts, New York.

H. J. Dressel has resigned as superintendent of transportation of the New Orleans Railway & Light Company, New Orleans, La. Mr. Dressel has been connected with the company for more than twenty years. The duties of the office of superintendent of transportation have been transferred to Nelson H. Brown, manager of the railway department.

H. J. Jumonville, formerly auditor of the New Orleans Railway & Light Company, New Orleans, La., and more recently auditor of the American Cities Company, with headquarters at New Orleans, has been appointed manager of the office opened on Feb. 1 in New Orleans by Haskins & Sells, certified public accountants, New York. Mr. Jumonville was born on July 29, 1879. He entered business with the Edison Electric Company, New Orleans, in 1896. All of his business career up to the present time has been with public service corporations.

John S. Bleecker, manager of the operating companies for Stone & Webster at Columbus, Ga., which includes the Columbus Railroad, has been appointed general manager of the New Orleans Railway & Light Company, New Orleans, La., by J. D. O'Keefe, receiver of that company. This is a new office with the company at New Orleans. All of the present departmental heads of the corporation will, it is announced, continue with the company, Mr. Bleecker assuming general charge of operation under Mr. O'Keefe. As at present organized, the company has separate managers for its railway and light departments. Mr. Bleecker has long been connected with Stone & Webster. He was born in Washington, D. C., on April 8, 1878. He is the son of Rear Admiral J. V. B. Bleecker, United States Navy. Mr. Bleecker was graduated from the English High School at Boston, Mass., in 1894 and from the Massachusetts Institute of Technology in 1898. He was employed in the mechanical department of the American Bell Telephone Company at Boston immediately after graduation and remained with that company until 1900, when he entered the service of Stone & Webster Engineering Corporation. In the interests of this large holding system he has filled various positions at Boston, Seattle, Houghton, Blue Hill, Paducah and Columbus, the duties covering a very wide range of activity.

J. S. BLEECKER

W. E. Coman, vice-president and general manager of the Northwestern Electric Company, Portland, Ore., has been elected vice-president and general manager of the Washington Water Power Company, Spokane, Wash., to succeed Harry L. Bleecker, deceased. He will assume his duties at Spokane about March 1. Mr. Coman is one of the best known electric lighting and power men in the Northwest. He began his career as a clerk with the Oregon-Washington Railroad & Navigation Company. He rose quickly in the freight department through his grasp of transportation essentials and was made in succession chief freight clerk, assistant general freight agent and then general freight agent of the merged Harriman line. In 1910 the new Spokane, Portland & Seattle Railway opened with Mr. Coman as its general freight and passenger agent. In 1912 he accepted the position of vice-president and general manager of the new Portland power company, the Northwestern Electric Company.

Frank H. Swan, appointed receiver of the Rhode Island Company, operating all the electric railways in Rhode Island, is the senior member of the law firm of Swan & Keeney, Providence. The firm was established in 1916, and for eleven years prior to that time Mr. Swan had been a member of the firm of Edwards & Angell, one of the most widely known law firms in the State. The receiver was born in Windham, Me., forty-five years ago. He received his primary education at Friends School, now the Moses Brown School, Providence, and was graduated from Bowdoin College, Me., in the class of 1898. He entered Boston University and completed the law course at that institution in 1901. After leaving Boston University Mr. Swan took up the practice of law in Portland, Me., and was chosen city solicitor of Westbrook, a city about 5 miles from Portland. He then served as assistant to United States District Attorney Isaac Dyer at Portland for three years, following which he removed to Providence. Mr. Swan has had extensive experience in corporation law and has specialized in public utilities.

Gardner F. Wells, who has until recently been manager of the division of transportation of the United States Housing Corporation, has resigned to enter the consulting engineering field with particular reference to public utilities. For fifteen years, from 1901 to 1916, Mr. Wells was with Stone & Webster. For the first five years of this period he was engaged in property management and in engineering and construction work. For the remainder of the time he was an appraisal expert, making office and field examinations and preparing reports and appraisals of public utilities. This work covered the entire country and included the public utility properties belonging to the New York, New Haven & Hartford Railroad. Before joining Stone & Webster Mr. Wells spent ten years with the Thomson-Houston and General Electric Companies on engineering, construction and management work in connection with electric railway and other utility properties, going with the first-named property from the Massachusetts Institute of Technology where he spent a year in engineering study. Since March, 1916, he has been head of the corporation bond buying department of Arthur Perry & Company, Boston, and during the war period served first as major in the Ordnance Department of the army and later joined the staff of Otto M. Eidlitz, head of the government Bureau of Industrial Housing and Transportation.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

White-Cedar Pole Business Outlook

Slow Readjustment of Values to Follow Price Changes for Commodities Used by Producers

The twenty-third annual meeting of the Northern White Cedar Association was held at the Hotel Radisson, Minneapolis, Minn., on Jan. 20, 21 and 22. In his address President Gerich said: "The year 1919 will develop a readjustment of values much greater in some commodities than in others. Our industry should work with cautious optimism, knowing its cost, watching its expenses, and it would seem to me that with a gradual readjustment of values, not only of our own products but of those we use so heavily in producing poles, the cedar industry should have a gratifying peace future of prosperity."

Among other topics discussed by the various committees and the delegates were the railroad freight rates, insurance, the labor situation and the substitution of metal and other commodities for forest products.

The following officers were elected for the ensuing year: President L. L. Hill of the Page & Hill Company, Minneapolis; vice-president, L. A. Furlong of the Valentine-Clark Company, Minneapolis; treasurer, W. B. Thomas of Manistique; secretary, H. B. Boucher of Minneapolis; directors, F. Finch of Duluth and M. J. Bell of Minneapolis.

Paints and Varnishes Quiet

Consuming Trade Shows Little Activity —Drop in Price of Materials Brings Slight Improvement

At this time of year traction companies might well consider the question of the application of paint, enamel and varnish to rolling stock. Probably never before in the history of the electric railways have cars gone so long without attention of this character as they have in the last four years. It is true that the materials entering into the manufacture of paints, enamels and varnishes have been scarce and high in price, but now their supply is ample and prices have begun to decline.

The consuming trade is disposed to hold back as much as possible waiting for lower prices, but the possibilities of quoting very much lower prices on the finished product are not as yet presented by any material decrease in the costs of production. There has been a gradual yet steady improvement in the situation, however.

The manufacturers of brushes are having considerable difficulty in securing materials, and say they cannot see how prices can very well be lower.

The reductions in price of containers, both tin and wood, are so slight as to have little appreciable effect on the price of the delivered covering material.

Bituminous Coal Output Falling

Anthracite Production, However, Still Showing Gain—Daily Average Shows Increase for Coal Year to Date

A considerable decrease occurred in production of bituminous coal during the week ended Jan. 25, the output declining to the low level of 9,159,000 net tons, according to the regular weekly report of the Geological Survey. This production which falls approximately 750,000 net tons below the preceding week, and approximately 1,000,000 net tons below the corresponding week of last year, is at the rate of 475,000,000 net tons per annum and is considerably below present consumption.

Many consumers are now using coal accumulated during last summer, and the present good weather enables certain consumers to await the outcome of the raising of the zone and price restrictions by the United States Fuel Administration before placing their orders.

The daily production of bituminous coal during the current week estimated at 1,526,000 net tons is 19 per cent below the daily average for the coal year to date and 13 per cent behind the daily average for the same period of last year. The total production for the period April 1 to Jan. 25 is now estimated at 485,656,000 net tons and is 34,855,000 net tons or 7.7 per cent in excess of last year's production for the same period of time.

The production of anthracite increased considerably during the week ended Jan. 25, and was slightly in excess of the average weekly production for the coal year to date. Preliminary estimates place production of anthracite for the current week at 1,886,000 net tons as against 1,786,000 net tons during the week of Jan. 18, and as against 1,719,000 net tons during the week of Jan. 25, 1918. The daily average during the current week, estimated at 314,000 net tons, is a slight increase over the daily average for the coal year to date, and but 3000 net tons, or 1 per cent behind the daily average for a similar period of last year.

Conditions in Track Supplies Market

Drop in Price Noted On Standard Hardware, But Track Specialties and Ties Unchanged

So much labor is figured in the production of crossings, frogs, switches, etc., that the price of these track specialties has not decreased recently.

Standard track hardware has, however, shown some changes since the signing of the armistice, railroad spikes have come down from 4.5 cents to 3.9 cents per pound, while screw spikes hold at 8 cents. One quarter of a cent has come off the previously reported 3¼ cents for tie plates, both flat and brace, fish plates, angle plates and angle bars, while tie rods have held at 7 cents. Rail bolts and nuts continued at 4.9 cents per pound, while steel bars have dropped from 2.9 cents to 2.7 cents.

The supplying of cross-ties for steam roads has been taken out of agents' hands. It is reported that the government regional directors in the different sections of the country issue bulletins stating the price they will pay for ties delivered on their right-of-way, this price being in general higher than that which agents would have stated. However, a good maintenance business has been carried on with the electric lines.

Most of the Southern tie camps were worked by negroes. So many of these laborers have been taken into service that production has been materially curtailed. There has been no change in price reported.

Fare Boxes and Registers Especially Active

Many Traction Companies Taking Steps to Safeguard Income—Jitneys Required to Register Fares

A very active field, both during the war and since the armistice, has been found to exist for fare boxes and fare registers. With the increase in price of all railway maintenance equipment, traction companies apparently have realized the safeguarding of every cent of income to be a most important item.

The increased operating and maintenance expenses were in many cases met by increased fares, either straight increases or the adoption of the zone system. In either case accurate collection and registration of fares was sought in order to safeguard the traction company not only through its employees but also through the traveling public.

Many cities are requiring jitneys operating within their limits to accurately record all fares received from passengers, so that a certain return can be made to the city based on the number of fares paid. The cities in many cases are co-operating with the jitneys in this matter in that the necessary equipment is being bought by the city and sold to the jitney owners on the installment plan.

Copper Drops to 18½ Cents

Action of Big Producers Brings Market to Life with 7,000,000 Lb. Buying

Copper was offered Thursday by the big producers at 18½ cents a pound, a reduction of 4½ cents a pound from the 23-cent level which prevailed after the first of the year when the government price fixing ended. The 23-cent price was quoted for foreign trade by the Copper Export Association and thereupon became the price at which the producers held the metal for domestic trade. The price of 23 cents brought little or no buying into the market and the industry was stagnated with the copper mined piling up as a big surplus.

The smaller producers have, for the last week, been selling copper at 18½ cents and on Wednesday the large producers began offering the metal at the same figure.

John D. Ryan, chairman of the board of the Anaconda Copper Mines Company, declared that the action of some of the companies in cutting the price had cleared the copper situation to some extent at least. He said that he felt more confident about the situation now than he had before, and declared that a "substantial market" had been opened by the price cutting action.

The immediate effect of the cut was the bringing about of sales of approximately 7,000,000 lb. of copper or more than six times the volume of sales of any day in January.

It was asserted that, relatively speaking, demand was lacking. The fact that actual sales were being consummated however was taken as a hopeful sign by some observers.

New Process Gear Corporation Changes Hands

John N. Willys has purchased outright the New Process Gear Corporation of Syracuse, N. Y., taking over all of the $3,000,000 capital stock of the concern. There is no change contemplated in the nature of the product the company will manufacture, although it is naturally expected that material expansions in the old field will result. It is the intention of the company to solicit gear business of all kinds, and particularly in so far as the manufacture of gears relates to differentials and transmissions for the automobile trade. Thomas W. Meachem and other members of the Meachem family connected with the corporation have retired, having sold their interests to Mr. Willys. On the latter's part this step represents complete acquisition of a plant in which he previously had been partially interested. No change of active management has been intimated, immediate control of the enterprise being in the hands of J. Allan Smith. The new officers of the company are: J. N. Willys, chairman; J. Allan Smith, president; J. E. Kepperley, vice-president; C. A. Neracher, vice-president; E. J. Quintal, treasurer and assistant secretary.

Rolling Stock

Denver & Interurban Railway, Denver, Col.—Fort Collins branch, has just been taken over by the city of Fort Collins. W. B. Cheek, city engineer, has written that the old cars, although in excellent shape, are considered too heavy for local conditions and will be sold, light-weight cars to be operated in their place.

Brooklyn (N. Y.) Rapid Transit Company is placing an order for fifty center-entrance trail cars with the J. G. Brill Company, Philadelphia, Pa. The dimensions and specifications for these trail cars are the same as those given in the ELECTRIC RAILWAY JOURNAL for July 8, 1918, referring to an order for fifty of these cars placed with the Jewett Car Company. This latter order has not been filled.

San Francisco-Oakland Terminal Railways, Oakland, Cal., in addition to the ten cars purchased from the Street Railway Company at Spokane, Wash., as noted in these columns of Nov. 12, and the ten steel center entrance trailers under construction in their own shop, as noted in these columns of Sept. 28, is reconstructing thirteen old California type open cars, the first of which is in operation.

New Advertising Literature

Wayne Oil Tank & Pump Company, Fort Wayne, Ind: Booklet dealing with storage and distribution systems for oils, varnishes, gasoline.

Ajax Metal Company, Philadelphia, Pa.: Two booklets, "A Text Book on Babbitt Metals" and "A Text Book on Ajax Ingots." The first tells the way to pick the right babbitt, how to pour babbitt, etc. The second gives interesting facts of the methods of producing and using Ajax ingots.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa: Reprint No. 71, "The Advantages of Railroad Electrification"; Reprint No. 73, railway motors, acceleration of cars and economical car operation; Reprint No. 74, "Dipping and Baking"; Reprint No. 75, "Trolley Transports"; and Reprint No. 77, "The Success of the Safety Car."

Trade Notes

C. N. Barney, 115 Broadway, New York City, has been appointed to act as local representative for the Worthington Pump & Machinery Corporation.

C. F. Lamont has recently been released from the navy and resumed his position as Northern representative of the Electric Service Supplies Company, Chicago, Ill.

G. H. Knutson, member American Society of Civil Engineers, who, for the last eight years, has been a partner in the Fargo Engineering Company, consulting engineers, Jackson, Mich., is now associated with the corporation department of the Harris Trust & Savings Bank of Chicago.

Roller-Smith Company, New York City, has appointed Frank R. Ryan to the sales force of its Chicago office in place of C. H. Nicholson, now in charge of the Detroit office. Mr. Ryan has been with the Commonwealth Edison Company, the Krehbiel Company, and the United States Signal Corps.

H. W. Johns-Manville Company is reported to have purchased a tract of 255 acres on the lake shore at Waukegan, Ill., upon which it intends to construct a three-million-dollar plant to manufacture asbestos and magnesia products. The plant is to have a capacity of 35,000 cars yearly, and it is understool that it will employ 2500 to 3000 people.

Ohio Brass Company, Mansfield, Ohio, states that prior to the signing of the armistice the mill supplying brass for O-B extruded trolley ears was so loaded up with government orders that commercial orders were virtually unobtainable. The situation is now, however, clearing up rapidly and the company states that the usual stock shipments of extruded ears can now be expected.

Paul Campbell has been appointed factory manager of the Electric Service Supplies Company of Philadelphia, Pa. Previously he was production manager for James Cunningham Son & Compay of Rochester, N. Y.; and superintendent of the F. B. Stearns Company, of Cleveland, Ohio, where he originated the manufacturing methods used in the first successful commercial production of the "Silent-Knight" motor car in America.

P. W. Jenkins, lieutenant, U. S. N. R. F., has been appointed manager of railway sales of the American Rolling Mill Company, effective Jan. 4. Previous to the entry of the United States into the European war, Mr. Jenkins was in charge of sales of castings and forgings for this company. When the war broke out he was given indefinite leave to re-enter the navy from which he had resigned in 1913. Lieutenant Jenkins served as an engineering officer on a navy transport throughout the war. Upon cessation of hostilities he was released from active duty.

Franchises

Quincy, Mass.—The Massachusetts Highway Service Company has asked the City Council of Quincy for a franchise to operate a trackless trolley line in Quincy from the Braintree line along Quincy Avenue to the Fore River plant, thence into the housing development.

Trenton, N. J.—The Trenton & Mercer County Traction Corporation has asked the City Commission of Trenton for an ordinance to extend its West State Street line through the tunnel under the Delaware & Raritan Canal to a connection with the Trenton Junction line and also for permission for the removal of its tracks along Sullivan Way.

Buffalo, N. Y.—In order to relieve congestion in the downtown section of the city and comply with an order of the Public Service Commission for the Second District of New York, the International Railway has applied to the City Council of Buffalo for permission to lay a single-track loop around the Soldiers' and Sailors' monument in Lafayette Square, together with the necessary switch tracks in Washington Street. It is planned to turn back several east side car lines at Lafayette Square instead of operating the cars over the Washington Street route through the badly congested heart of the retail shopping district. The City Council will investigate the situation, but it is believed the franchise will be issued.

Track and Roadway

Chickasaw Utilities Company, Birmingham, Ala.—After July 1, the Chickasaw Utilities Company, a subsidiary of the Chickasaw Shipbuilding Company, will take over, maintain and operate its own car line between Prichard and Chickasaw, with current from its own station now under construction. The line is now operated under contract by the Mobile Light & Railroad Company, George Gordon president.

Montgomery Light & Traction Company, Montgomery, Ala.—Repairs and improvements have been begun by the Montgomery Light & Traction Company on its street railway system and cars.

San Francisco - Oakland Terminal Railways, Oakland, Cal.—As soon as weather conditions permit, the San Francisco-Oakland Terminal Railways will reconstruct its tracks on Telegraph Avenue south of Fortieth Street, at a cost of $104,636.

United Railroads of San Francisco, San Francisco, Cal.—The Board of Supervisors of San Francisco has approved the expenditure of $45,000 by the United Railroads of San Francisco for the reconstruction of the company's tracks on Taraval Street, between Twentieth and Twenty-third Avenues.

Kensington (Md.) Railway.—A report from the Kensington Railway states that it will probably construct a 3-mile extension to North Sandy Spring during 1919.

Columbus Railway, Power & Light Company, Columbus, Ohio.—Plans are being made by the Columbus Railway, Power & Light Company to improve its tracks on High Street, from Poplar to Fifth Avenues; Broad Street, from Anson to Sandusky Streets; Third Street, from Naghten Street to Livingston Avenue; Main Street, from Allen Street to Alum Creek; Goodale Street, from High to Henry Streets and Livingston Avenue, from High Street to Parson Avenue.

Evansville & Ohio Valley Railway, Evansville, Ohio.—The lines of the Evansville Railway, recently taken over by the Evansville & Ohio Valley Railway, will be improved and extended during the coming summer. The extension from Henderson to Owensboro, which has been surveyed, will be pushed to completion. The company will form a subsidiary company to erect a traction and wagon bridge across the Ohio River, provided the necessary bill is passed by the Legislature.

Grand Trunk-Wabash Railway, St. Thomas, Ont.—It is reported that the lines of the defunct London & Lake Erie Traction Company between Thomas and Lake Erie are being reconstructed and operation will soon be begun by the Grand Trunk-Wabash Railway.

Dallas, Tex.—The construction of an electric interurban line from Dallas to Wichita Falls, a distance of about 180 miles, is being advocated by business men of both cities and of the towns along the proposed route. The development of the oil fields about Wichita Falls is one of the chief reasons for the proposed interurban line. Several routes have been proposed, but the one most favored would touch the following towns: Carrollton, Lewisville, Denton, Decatur, Alvord, Sunset, Bowie, Bellevue, Henrietta and Wichita Falls, and scores of smaller towns along the route. The proposition is being supported by J. F. Strickland, president of the Texas Electric Railway, the Dallas Railway and other traction and electric light and power interests in Texas; C. W. Hobson, general manager of the Southwest General Electric Company; J. A. Kemp and Frank Kell of Wichita Falls, and by other business men of Dallas and other cities in this part of the State.

Virginia Railway & Power Company, Richmond, Va.—Rails are being distributed by the Virgina Railway & Power Company on Liberty Street and Berkley Avenue, Berkley, for the double-tracking and rerouting plan which is to be put into effect early in the spring. The line on Liberty Street will be double-tracked and a single-track line will be laid on Berkley Avenue. The tracks on Pearl, Walnut, Clifton, Patrick, Second Streets and Walker Avenue, will be taken up.

Power Houses, Shops and Buildings

San Francisco - Oakland Terminal Railways, Oakland, Cal.—A new car overhauling shop has been completed by the San Francisco-Oakland Terminal Railways at a cost of $10,455.

Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md.—Application has been made by the Washington, Baltimore & Annapolis Electric Railroad to the Public Utilities Commission of the District of Columbia for permission to construct a terminal station in Washington. The site is adjacent to the line of the company at New York Avenue between Eleventh and Twelfth Streets Northwest. The proposed building will have larger waiting rooms, ticket offices, baggage rooms, etc., than those in the present station at New York and Fourteenth Streets.

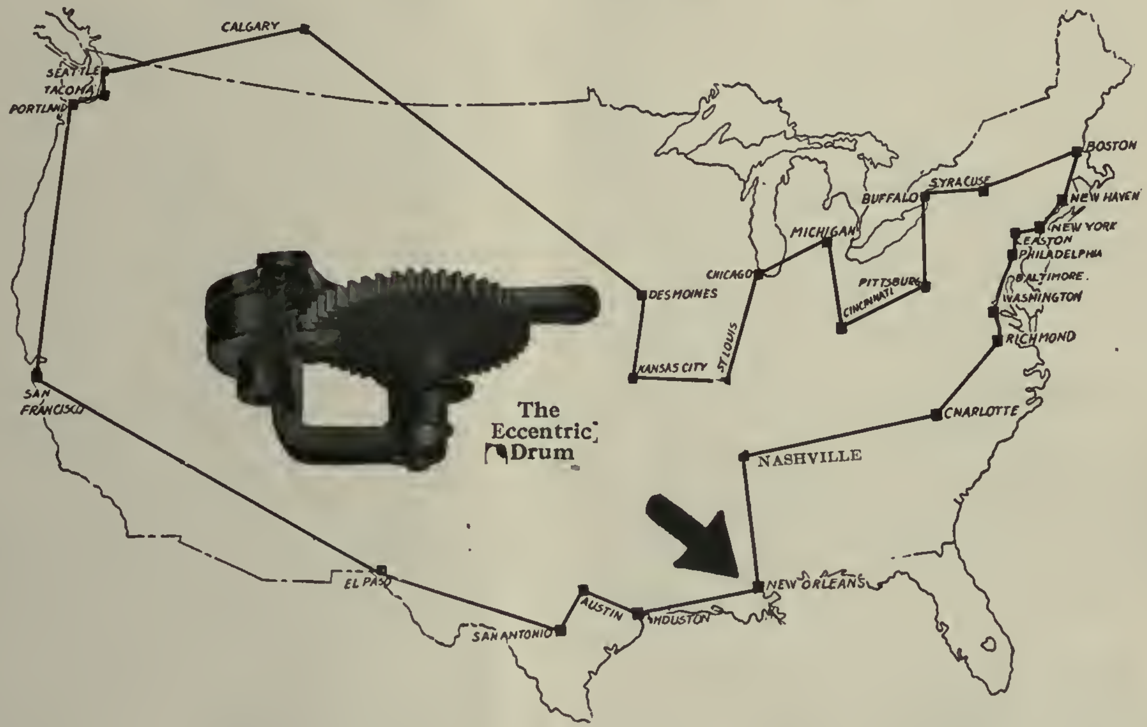
Trenton & Mercer County Traction Corporation, Trenton, N. J.—The Trenton & Mercer County Traction Corporation is constructing two additional repair pits at its carhouse on Lalor Street and has just completed a new slate roof on the building at a cost of $12,000. The company has also contracted for a grinding machine to be used in grinding the flat parts of car wheels.

Sand Springs Railway, Tulsa, Okla.—A report from the Sand Springs Railway states that it will construct a new station building at Tulsa during the present year.

Peterboro (Ont.) Street Railway.—The Hydro-Electric Power Commission of Ontario, which operates the Peterboro Street Railway, advises that it proposes to construct a new 1500-kw. rotary substation.

Seattle, Wash.—The Light Department has asked for the sale of $750,000 in bonds out of the total issue of $1,755,000 authorized last fall to provide for the following construction work during the present year: Substation on Spokane Street at Whatcom for the purpose of operating the elevated railway, to cost $165,000; completion of Ballard substation to furnish electricity to the northwest part of the city and to operate the north end of the municipal railway, $30,000; for strengthening the present distributing system, $50,000; for general construction work within the city limits, $100,000; for completing sealing operations at the Cedar River dam, $200,000; construction of a new 6-ft. pipe line from the dam to the power house at Cedar River, $125,000; for an interconnection with the lines of the Puget Sound Traction, Light & Power Company, $75,000. The remainder of the $1,755,000 will be expended during the next three years in building a substation at the north end costing about $250,000 and another at the south end, to cost about $200,000, and in other additions to the lighting system to take care of the power to be secured from the Skagit project.

Peacock Brakes from Coast to Coast



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And in order to make sure of your receiving your notice and to impress upon you the urgency of renewing before March 1st, if you wish to accept this money-saving offer, we have written to you several times.

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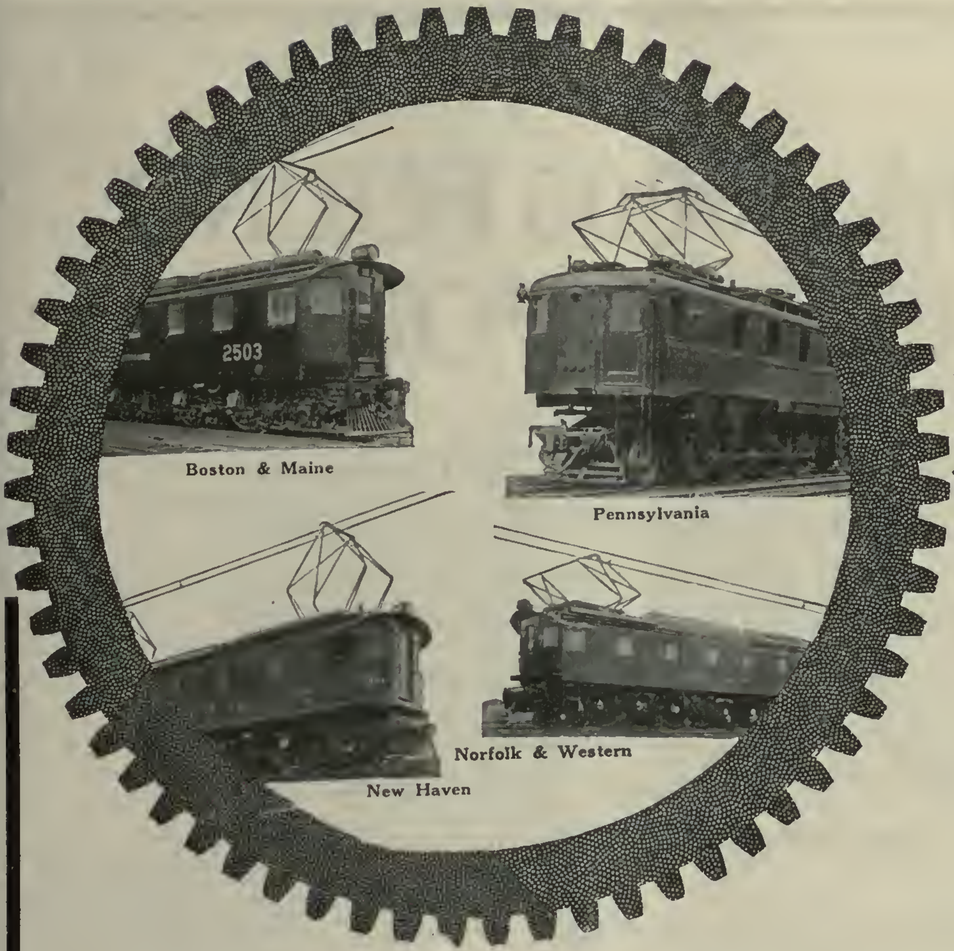

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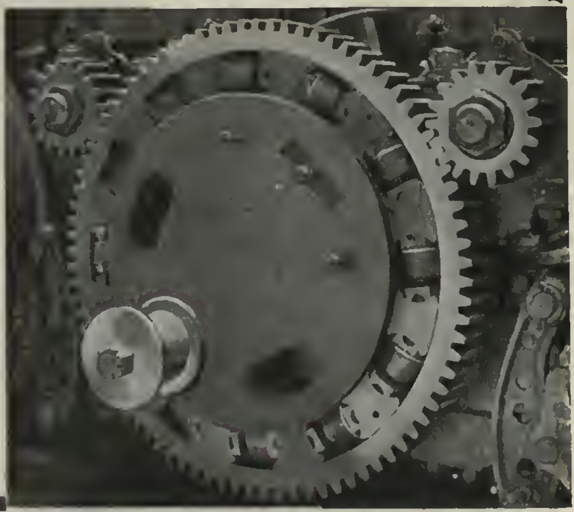

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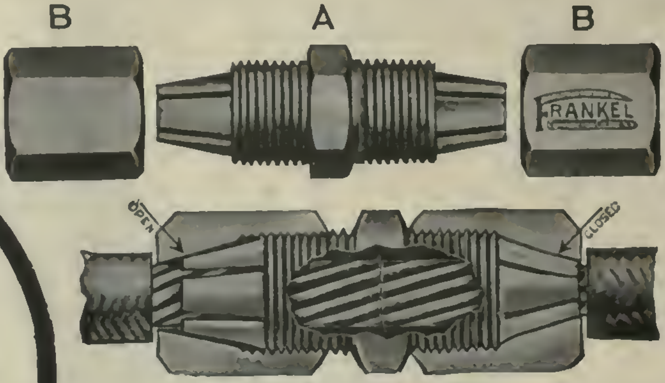

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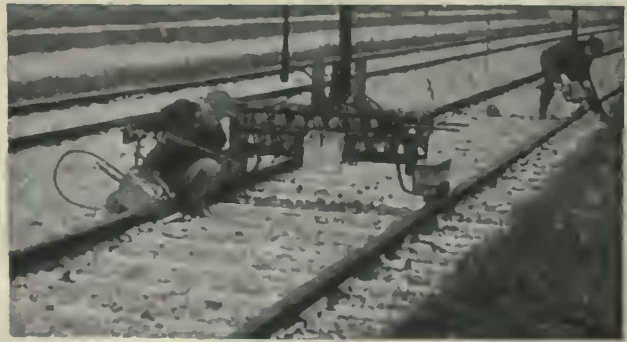

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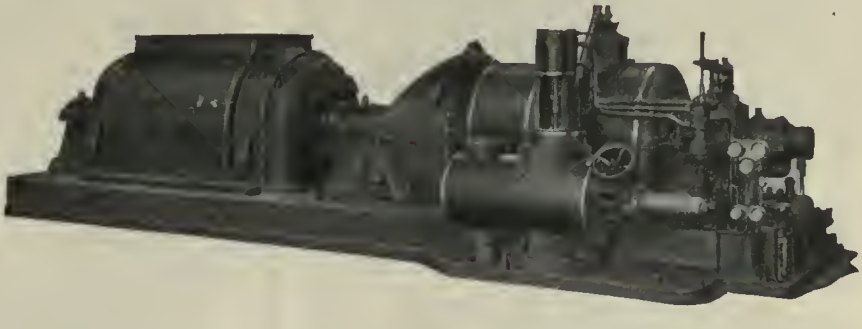

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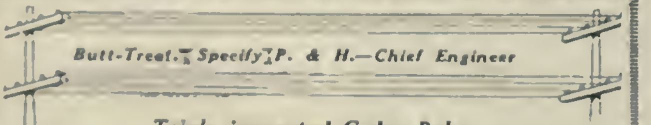

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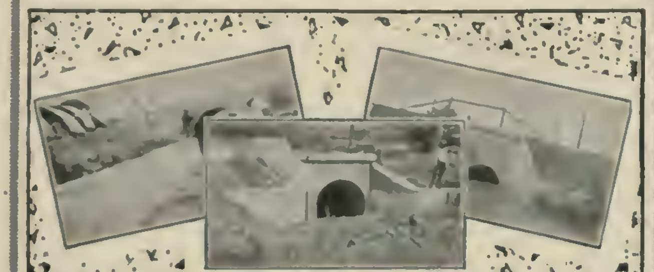

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insures maximum efficiency
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Lincoln Dynamotors
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By doing the work of six to twelve men the SCOOP CONVEYOR cuts costs and keeps equipment moving. Used for storing and reclaiming, for loading and unloading coal, coke, sand, gravel and similar materials, as well as for handling boxes, crates, bags and bulky packages.
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Frogs, Crossings, Switches and Mates
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SPECIAL TRACK WORK

SWITCHES, FROGS AND CROSSINGS.
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TRACK WORK
OF EVERY DESCRIPTION.
HARD CENTER CONSTRUCTION.

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HIGHEST QUALITY

TRACK SPECIAL WORK

HIGHEST QUALITY SAFETY DURABILITY C F & C

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Dependable Track Work for Electric Railways

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PANAMA PACIFIC GRAND PRIZE INTERNATIONAL EXPOSITION

American
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It is carefully prepared, thoroughly cleaned, will not disintegrate and lasts for ages.

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1163

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Night work is a railway necessity. It is the best time for repairs and new construction. Schedules are low, traffic scarce. But you need light, and plenty of it. Light in the dark corners—light that shows up every detail and minimizes costly errors. You need the *night sunshine* supplied by Milburn Portable Acetylene Lights.

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Greatly Increase Efficiency and Power of Steam Turbines.
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Automatic Safety and Automatic Return Switch Stands for Passing Sidings. Tee Rail Special Work for Interurban Lines and Private Rights of Way. Manganese Construction a Specialty.
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PREVENTS SPLIT SWITCHES
A positive locking switch lock that locks right and left. Waterproof, non-freezable, mud-proof and sand-proof. Simple in construction, perfect in operation and easily installed. Positively prevents split switches.
Write for complete information and quotations.
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is the only refill liquid for one quart extinguishers that is recommended for *all* makes of extinguishers.

There has been no advance in price, on the contrary because of manufacturing economies our average prices are somewhat lower than prices existing prior to our entrance into the War.

If your extinguishers are empty you are taking a desperate chance. Do not flirt with possible regret any longer. Wire your order in quick. Prompt shipment guaranteed.

Castle Liquid is sold under a broad money-back guarantee

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The Automatic Reclosing Circuit Breaker

The exacting requirements of public service demand that service interruptors shall be minimized in extent and duration as much as can be. The AUTOMATIC RECLOSING CIRCUIT BREAKER.

Localizes D.C. Trouble and Restores Service —Automatically

—the instant the line is again O.K. The protection afforded by AUTOMATIC RECLOSING CIRCUIT BREAKERS is *complete* protection.

Write for Bulletins

The Automatic
Reclosing
Circuit Breaker Co.
Columbus, Ohio

AUTOMATIC RECLOSING CIRCUIT BREAKERS
PROTECT APPARATUS AND SERVICE

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TOLEDO CRANES

LIFT YOUR LOAD

Get in touch with us

TOLEDO BRIDGE & CRANE CO.
TOLEDO, OHIO

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We specialize in the manufacture of

High Grade Motor and Generator Brushes

For Railway Equipment

and for all other types of electrical machinery and are in position to make prompt deliveries.

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We guarantee immediate deliveries, reasonable prices; first class workmanship to stand any test No tapping necessary on threads of bolts after galvanizing
Galvanized angles furnished cut and bent to length and punched

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PURIFICATION SYSTEMS
SOFTENING & FILTRATION
FOR BOILER FEED AND
ALL INDUSTRIAL USES

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I. T. E. Circuit Breakers

for heavy street railway work are the best obtainable. Write for New Complete Catalogue.

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Green Engineering Co. East Chicago, Ind.

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MACHINE TOOLS
For Electric Railway Repair Shops

Axle Lathes
Wheel Presses
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Full power with
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Many emergencies requiring a powerful jack present a difficulty in bringing the jack to bear on the load. The

Buckeye Emergency Jack No. 239 Special

saves time, strength and trouble. The many positions to which it is adjustable easily solve perplexing lifting problems. Full details in our catalog. Write for it.

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Williams' Superior Drop-Forged "C" Clamps

"THEY STAND THE STRAIN"

SELECT the clamp best adapted to your needs—"There's a Williams' Clamp for every purpose."
Williams' "Vulcan"—for Heavy Service—11 sizes, ¾ to 12½ inches'
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Machinists' Tools Booklet on request.

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IMPERIAL WELDING AND CUTTING EQUIPMENT
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QUALITY

Welds everything in metal—cuts anything in steel or wrought iron. Excels in Speed, Safety, Efficiency and Economy. Write for Free Catalog.
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"Everything in Insulation"

Mica
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The above are only a few of our products
Write us for anything in this line you may require.
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Simplex Jacks
for
Railroads-Contractors-Industries
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Established 1899
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75% of the electric railways
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A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only Block that carries a five-year guarantee.

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INSULATING TAPE
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STANDARD
Woven Fabric Co.
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No. 108, Concave Seat
For One-Man and Other Cars

Only four parts—Steel Aisle End Support, Steel Wall End Support, hardwood-framed Rattan Cushion and Rattan Back. Note new yokeless pedestal and concave cushion

This No. 108 seat is only ONE-HALF THE WEIGHT OF SEATS WITH IRON CASTINGS.

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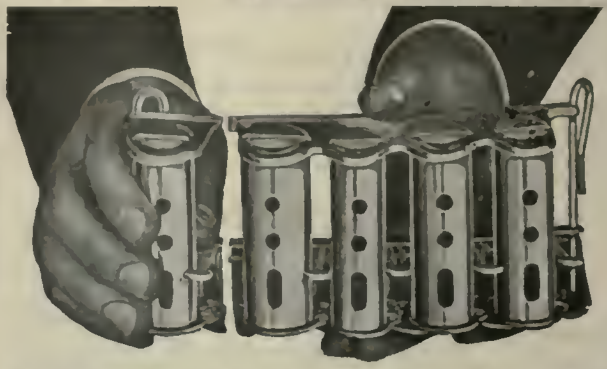

A Great Improvement in Coin Changers
The McGill HIGH-SPEED Lever-operated Changer is now built with a gear movement instead of a curved cam. If desired a fifth barrel can be attached, which will meet all practical requirements of fare collections. The new machine can be supplied to eject quarters, dimes, nickels, single pennies, or 4 or 5 pennies at one time. Also 4 nickels at a time; also metal checks for fare box service.
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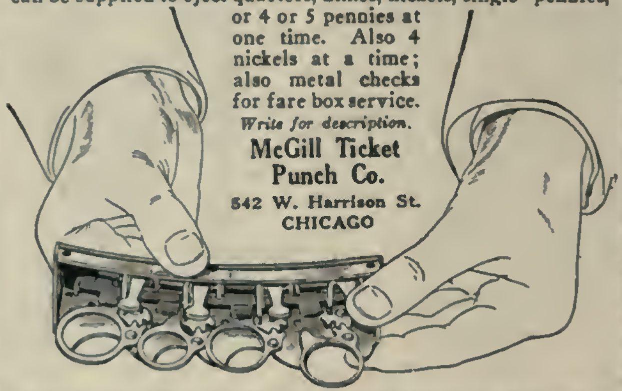
542 W. Harrison St.
CHICAGO



"It Behooves You to Hooverize Your Motormen"

We can help you
Write to
The Arthur Power-Saving Recorder Co.
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WE CAN CUT YOUR COST OF
HEATING CURRENT
Write for THERMOSTATIC CONTROL INFORMATION
GOLD
ELECTRIC HEATERS Cut Installation and Maintenance Charge.
VENTILATORS Also Ventilate in Stormy Weather.
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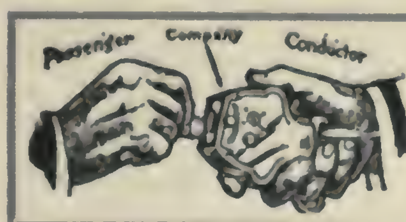
ORIGINATED the use of NON-CORROSIVE Wire for Electric Car Heaters.
ORIGINATED The Ventilated Coil Support.
LET US FIGURE ON YOUR NEXT REQUIREMENTS
Gold Car Heating & Lighting Co., 17 Battery Pl., New York



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Electric car heaters—thermostatic control—pneumatic car door operators—buzzers, single-stroke bells, starting signal lights—special resistances.
CONSOLIDATED CAR HEATING CO.
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The Economy
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Induces
Power Saving.
Our power-saving bulletins will vitally interest you right now. Ask for them

Economy Electric Devices Co., Chicago

Use them in your terminals—
PEREY TURNSTILES
or PASSIMETERS
Faster than the ticket seller
Perey Manufacturing Co., Inc.
30 Church Street, New York City

International Specialties Cover the Entire Range of Fare Collection

Money-counting fare boxes; Coin and metal ticket-counting fare boxes; Coin registers; Coin and transfer registers; Coin, metal ticket and transfer registers; Motor-driven coin and transfer registers; Motor-driven registers for station, ferry, park and terminal use; Metal and paper registers with single hopper; Round and square registers; Transfer printers; Heeren Enameled Badges; Punches and Bell Cord.

The International Register Company
15 South Throop Street, Chicago

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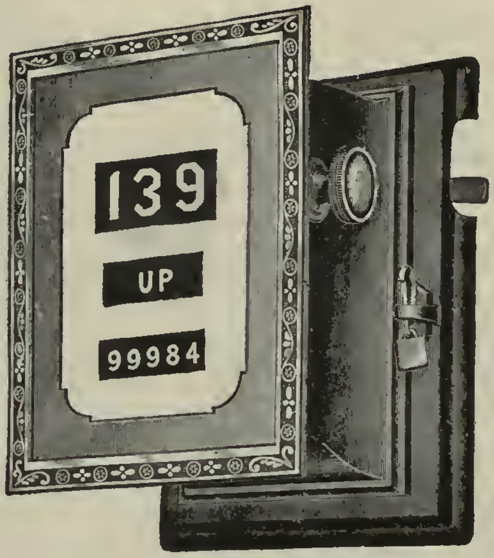

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Repairing at Short Notice.

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You will buy
CLEVELAND Fare Boxes
Eventually—
Why not now?

Cleveland Fare Box Co.
CLEVELAND, OHIO

Holden & White Inc.

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Anderson Brake Slack Adjusters.
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FUEL CONSERVATION

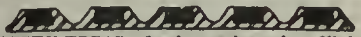
is a necessity and the heating and ventilating of street cars should be accomplished the most economical way. Our Hot Air Forced Ventilation Equipment combines heat with ventilation at a saving of 50% to 70% over electric heat.

THE PETER SMITH HEATER CO. DETROIT, MICH.

Heating and Ventilating

Let us demonstrate to you how we can heat and ventilate your cars at the lowest possible cost

The Cooper Heater Company
Carlisle, Pa.



MASON SAFETY TREAD—Lead or carborundum filled; non-slippery; prevents accidents; cuts out damage suits.

KARBOLITH CAR FLOORING—For steel cars; is sanitary, light weight fire proof, non-slippery.

STANWOOD STEPS—Self-cleaning, non-slippery, light. Over six million feet used without accident being reported within the knowledge of manufacturer.

Our products used on all leading railroads on cars and stations. For details address:

AMERICAN MASON SAFETY TREAD CO., Lowell, Mass.
Branch Offices: Boston, New York City, Philadelphia.
Agencies in all principal cities.

Bonham Traffic Recorders

Show origin and destination of every fare collected as well as other valuable traffic data.

The Bonham Recorder Co., Hamilton, O.

Get Your Wants into the Searchlight

ADVERTISING RATES

Ads Set in Uniform Style

(Solid, in one paragraph, without display.)

THREE CENTS A WORD, minimum charge 50 cents an insertion, payable in advance, less 10 per cent. if one payment is made in advance for four continuous insertions—for advertisements under:

Positions Wanted
Evening Work Wanted
Vacation Work Wanted
Tutoring
Salesman Wants Connections

FIVE CENTS A WORD, minimum charge $1.50 an insertion, for advertisement under:

Agencies Wanted
Agents Wanted
Business Opportunities
Desk Room for Rent
Educational
Employment Agencies
Desk Room Wanted
Foreign Business
Positions Vacant
Partner Wanted
Representations Wanted
Salesmen Wanted
Patents for Sale
Plants for Sale
Sub-Contracts Wanted
Work Wanted
Miscellaneous for Sale, for Rent or Want Ads.

THIRTY CENTS A LINE, minimum five lines, for all undisplayed advertisements set with a paragraph for each item or tabulated

THREE DOLLARS AND SIXTY CENTS AN INCH for advertisements for bids (Official Proposals).

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(Individual space, within border rules.)

Space for these advertisements is sold by the inch. Each page contains 30 inches. The rate per inch is based on the *total* number of inches to be used—that is, the number of inches the advertisement is to occupy multiplied by the number of insertions it is to receive. For instance, a 2-inch advertisement in 2 issues earns the 4-inch rate of $2.90 an inch. A 1-inch space in 4 issues, or a 4-inch space in one issue, also earn the 4-inch rate.

SCHEDULE OF RATES

1 to 3 in.,	$3.00 an in.	15 to 26 in.,	$2.70 an in
4 to 7 in.,	2.90 an in.	27 to 49 in.,	2.60 an in.
8 to 14 in.,	2.80 an in.	50 to 99 in.,	2.50 an in.

Rates for larger space furnished on request.

For quick and satisfactory results tell the reader everything that he will want to know.

INFORMATION

ALLOW FIVE WORDS for the address, if replies are to a box number in care of any of our offices. There is no extra charge for forwarding replies.

IN REPLYING TO ADS, do not enclose original testimonials or anything that you may want returned. State your experience and qualification in as concise and neat a manner as possible and enclose copies of your testimonials.

BE CAREFUL TO PUT ON ENVELOPE, when answering any "blind," ad, the box number in the ad, the name of the paper, and also the local address of office to which reply is sent:

36th St., at 10th Ave., New York
1570 Old Colony Bldg., Chicago
657 Leader-News Bldg., Cleveland
935 Real Estate Trust Bldg., Philadelphia
501 Rialto Bldg., San Francisco
519 Newhouse Bldg., Salt Lake City

WHEN ADVERTISING MACHINERY, use your own name and address—or a local address of some kind—so that the readers can wire direct and get quick replies. We advise also that you state in your advertisement the present location of plant that is offered for sale, or point of delivery provided you are in the market for equipment.

TO SIGN YOUR NAME and address to your advertisement begets the confidence of the reader and facilitates receiving replies. You can, however, obviate delay in receiving answers by signing your ad. only with initials (your own or others), care of your home, your office or a post-office box number in your city.

POSITIONS VACANT

A PRIVATE secretary wanted with street railroad experience, one familiar with traffic curves, taking care of correspondence, filing, etc. Address President, Mobile Light and Railroad Co., Mobile, Ala.

A TECHNICALLY educated mechanical and electrical engineer wanted with street railroad experience, to act as assistant to the president and general manager of the Mobile Light and Railroad Co., Mobile, Ala.

CASHIER—In public utility office, operating railway and electric departments, located in Middle West. Must be familiar with standard classification of accounts and capable of directing and handling office force. Address, stating age, experience and salary desired. P-335, Elec. Ry. Journal, Philadelphia.

EXPERIENCED auditor wanted for electric Railway and Light Company. Must be able to furnish good references. A good opportunity for the right man. P-334, Elec. Ry. Journal, Leader-News Bldg., Cleveland.

THREE armature winders wanted. Michigan Railway Co., Albion, Mich.

POSITIONS WANTED

ASSISTANT to chief engineer or general manager; 14 years' experience construction, operations, and engineering; general knowledge of mechanical, electrical transportation and accounting matters as related to way and structure department. Technically trained. PW-340, Elec. Ry. Journal.

ATTENTION—Street railway engineer over 10 years' experience, having been honorably discharged as major engineer U. S. Army after 20 months' service, desires to locate with growing concern where energy, strict application to duty and sound common sense methods are essentials. Have had considerable experience in revaluation work, heavy power house and building construction, power, installation and maintenance. Would consider management or organization. PW-336, Elec. Ry. Journal.

FARE expert. Army captain, formerly assistant to president of well known city railway, wants position as executive or assistant. Is expert on fare and traffic problems. Best references furnished. Salary $3500 to $4000. Address PW-338, Elec. Ry. Journal.

POSITIONS WANTED

MASTER mechanic, 10 years' experience, all kinds city and interurban equipment, sober and energetic; very successful organizing and handling men and producing results; finest references. PW-337, Elec. Ry. Journal.

AGENTS AND SALESMEN

Electrical Supply Salesman Wanted
With several years' experience (both in purchase and sales preferred) who commands a wide Chicago acquaintance, and an established trade can better his position by addressing fully. AS-333, Elec. Ry. Journal, Chicago.

Do You Wish Representation in Italy?
Civil engineer wishes to represent American firm. Best references. F. Zucchi, 70 Via Moscova, Milan, Italy.

Agency Wanted
In U. K. by firm of good repute and right connection for tramway supplies (gears and pinions, etc.) Apply AS-339, Elec. Ry. Journal.

WE ARE IN THE MARKET FOR

5 Second-Hand Double Truck Motor Cars and 2 Trailers

with a capacity of sixty, if possible, equipped with Westinghouse HL control for train operation. Motor cars to be two-motor equipment. Standard gage, track centers 9 ft. 9 in., overhead trolley, 600 volts.

TIDE WATER POWER COMPANY
Wilmington, N. C.

FOR SALE
8—General Electric No. 80
MOTORS
Complete
TRANSIT EQUIPMENT COMPANY
601 Fifth Ave., New York City

35 Tons
7-in. Girder Rails
P. S. Co. Section No. 238
HENRY LEVIS & CO.
Commercial Trust Bldg., Philadelphia, Pa.

FOR SALE
CARS
2—McKean Gaso-Electric Cars.
12—Differential 20-yd. Cars.
5—Gasoline Passenger Cars.
50—Freight Cars.
12—ELECTRIC SETS
Get our Lists and Prices
J. F. DONAHOO CO., Birmingham, Ala.

FOR SALE
MOTORS
10—Westinghouse 68 C individual, less gears, pinions and gear cases, but all bearings if desired. In good mechanical and electrical running order. **Also 15 K 11 A controllers.**
Good condition.
Address W. H. SHAW, *Pur. Agt.*
Georgia Ry. & Power Co., Atlanta, Ga.

Keep your eye on the Searchlight and your advertisements in it.

CLEVELAND ARMATURE WORKS
Incorporated
Cleveland, Ohio

Everything in the Line of Repairs to Electrical Machinery

Complete Armatures, New Armatures, Rewound Armature Cores, Armature Shafts, Armature Coils, Fields and Commutators.

Established 22 Years

ROTARY CONVERTERS

1—300-kw. Westinghouse Rotary Converter, 3-ph., 60-cy., 370-v. A.C., 575-v. D.C., 600 r.p.m.
1—200-kw. Westinghouse Rotary Converter, 3-ph., 60-cy., 370-v. A.C., 575-v. D.C.
1—150-kw. Westinghouse Rotary Converter, 2 or 3-ph., 60-cy., 250-v. D.C., 720 r.p.m.

TURBINE

1—500-kw. Westg. Horizontal, 3-ph., 60-cy., 370-v. (can be rewound for any standard voltage), 3600 r.p.m., with or without condensing equipment.

ARCHER & BALDWIN, INC.
114-118 Liberty St., New York, N. Y.
Telephone 4337-4338 *Rector*

WATER TUBE BOILERS

2—981 hp. Edge Moor, 235 lb. pressure.
1—450 hp. Heine, 170 lb. pressure.
4—400 hp. Stirling, 150 lb. pressure.
1—380 hp. Stirling, 150 lb. pressure.
2—360 hp. Erie City, 160 lb. pressure.
1—310 hp. Stirling, 200 lb. pressure.
6—308 hp. Heine, 140 lb. pressure.
1—305 hp. Babcock & Wilcox, 160 lb. pressure.
12—264 hp. Babcock & Wilcox, 175 lb. pressure.
8—250 hp. Stirling, 160 lb. pressure.
1—212 hp. Babcock & Wilcox, 160 lb. pressure.
2—204 hp. Babcock & Wilcox, 160 lb. pressure.

MacGovern & Company, Inc.
114 Liberty St., New York, N. Y.
Pittsburgh Office: 498 Union Arcade Bldg.

FOR SALE

RAILWAY MOTORS

40 G. E. 67 Railway Motors, complete.
12 G. E. 57 Railway Motors, complete.
12 G. E. 54 Railway Motors, complete.
20 G. E. 1000 Railway Motors, complete.
16 W.H.38-B Railway Motors, complete.
14 W.H.49 Railway Motors, complete.
8 W.H.56 Railway Motors, complete.
10 W.H.68 Railway Motors, complete.
40 W.H.12-A Railway Motors, complete.

CONTROLLERS

10 K-12 Controllers.
20 K-10 Controllers.
80 K-11 Controllers.

W. R. KERSCHNER COMPANY, INC.
50 Church Street, New York City, N. Y.

IMMEDIATE DELIVERY

Five new P.A.Y.E. double truck cars. Length, 45-ft. Equipped with 4GE Co.'s 247 Motors and G. E. Co. Air Brakes.

McGUIRE-CUMMINGS MANUFACTURING CO.
Cars and Trucks, Snow Sweepers, Electric Locomotives
111 West Monroe Street, Chicago, Ill.

WANTED

1—300 Kw.
ROTARY CONVERTER
3-phase, 60-cycle, 600-volts, D.C.

3—100 Kw. 33,000-volt
TRANSFORMERS
for above Rotary Converters
Switchboard for above

RAILWAY MOTORS
2—G.E. 73 C.
4—Wh 93 A

HAGERSTOWN & FREDERICK RAILWAY CO.
Hagerstown, Md.

RAILS

15,000 TONS—NEW and RELAYERS
NEW—12 lb., 16 lb., 20 lb., 25 lb., 30 lb., 40 lb., 60 lb., 70 lb., 75 lb., 80 lb., 85 lb., 90 lb.
RELAYERS—30 lb., 35 lb., 40 lb., 45 lb., 56 lb., 60 lb., 70 lb., 80 lb., 85 lb., 90 lb., 100 lb.

Fastenings, New Bolts, Nuts and Spikes. New Frogs, Switches, Crossings and all accessories. Carload and less carload inquiries and orders a specialty. Rails cut to lengths for structural purposes. Attractive prices. Immediate shipments from stock.

L. B. FOSTER COMPANY
Park Bldg., Pittsburgh, Pa.

Cars For Sale

12 Double Truck Motor or Trailers. Brill 27-F trucks, 28-ft. closed bodies.

3 SNOW PLOWS

2 single, 1 double truck

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

STREET CARS

(4 ft. 8½ in. gage)
3—32 ft. Closed.
Complete with equipment. First-Class. Will convert to one-man type.
4—9 Bench Open Trailers
Immediate Shipment

ZELNICKER IN ST. LOUIS
Get Bulletin 250—88 pages. Circulation, One Quarter Million
Railway, Power Plant & Industrial Equip.

Get your Wants into the Searchlight

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Rectifiers
Holden & White, Inc.

Anchors, Guy
Electric Service Supplies Co.
Holden & White, Inc.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Ash Storage Tanks, Cast Iron
Green Engineering Co.

Automobiles and Buses
Brill Co., The J. G.

Axle Straighteners
Columbia M. W. & M. I. Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Cambria Steel Co.
Carnegie Steel Co.
National Railway Appliance Co.
St. Louis Car Co.
Standard Steel Works Co.
Westinghouse Elec. & M. Co.

Babbitting Devices
Columbia M. W. & M. I. Co.

Badges and Buttons
Electric Service Supplies Co.
International Register Co., The

Batteries, Dry
Nichols-Lintern Co.

Batteries, Storage
Electric Storage Battery Co.

Bearings and Bearing Metals
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Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
More-Jones Brass & Metal Co.
St. Louis Car Co.
Westinghouse Elec. & M. Co.

Bearings, Center and Roller Side
Holden & White, Inc.

Bearings, Roller and Ball
Gurney Ball-Bearing Co.

Bells and Gongs
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Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail
Niles-Bement-Pond Co.
Zelnicker, Walter A., Supply Co., Inc.

Boilers
Babcock & Wilcox Co.

Boiler Tubes
National Tube Co.

Bond Testers
American Steel & Wire Co.
Lincoln Bonding Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Supplies Co
Imperial Brass Mfg. Co
Lincoln Bonding Co.
Ohio Brass Co.

Bonds, Rail
American Steel & Wire Co
Electric Railway Improvement Co.
Electric Service Supplies Co
General Electric Co
Lincoln Bonding Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Boring Tools, Car Wheel
Niles-Bement-Pond Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
American Bridge Co.
Bates Expanded Steel Truss Co
Hubbard & Co.
Lindsley Bros. Co
Ohio Brass Co

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Westinghouse Traction Brake Co.

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Columbia M. W. & M. I. Co.
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General Electric Co.
Holden & White, Inc.
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Westinghouse Trac. B. Co.

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Green Engineering Co.

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Jeandron, W. J.
Morgan Crucible Co.
National Carbon Co., Inc.
United States Graphite Co.
Westinghouse Elec. & M. Co.

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United States Graphite Co.

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Columbia M. W. & M. I. Co.
Eureka Co.

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American Bridge Co.

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Bemis Car Truck Co.

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.)

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Car Trimmings. (For Curtains, Registers, Doors, Seats, etc.—See those headings.)

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More-Jones Brass & Metal Co.

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Columbia M. W. & M. I. Co.
St. Louis Car Co.
Standard Steel Works Co.

Castings, Malleable and Brass
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Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

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Hubbard & Co.
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Westinghouse Elec. & Mfg. Co.

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General Electric Co.
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Rome Wire Co.
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General Electric Co.
Westinghouse Elec. & M. Co.

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General Electric Co.
Westinghouse Elec. & Mfg. Co.
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General Electric Co.

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Eureka Co.
General Electric Co.
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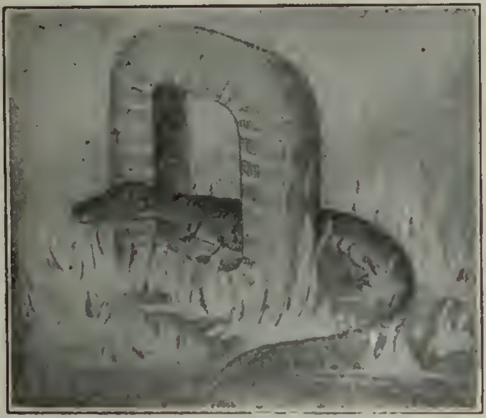

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Railway Track-work Co.

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Gold Car Heating & Lighting Co.
Smith Heater Co., Peter.

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Smith Heater Co., Peter.

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Ohio Brass Co
Westinghouse Elec & Mfg Co.

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Rattan
Brill Co., The J. G.
Electric Service Supplies Co.
Hale & Kilburn Corp.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

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Arthur Power-Saving Recorder Co.

Registers and Fittings
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Brill Co., The J. G.
Electric Service Supplies Co.
Exell Mfg. Co., The
International Register Co., The
Rooke Automatic Register Co.

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American Steel & Wire Co.

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Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

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Columbia M. W. & M. I. Co.
General Electric Co.
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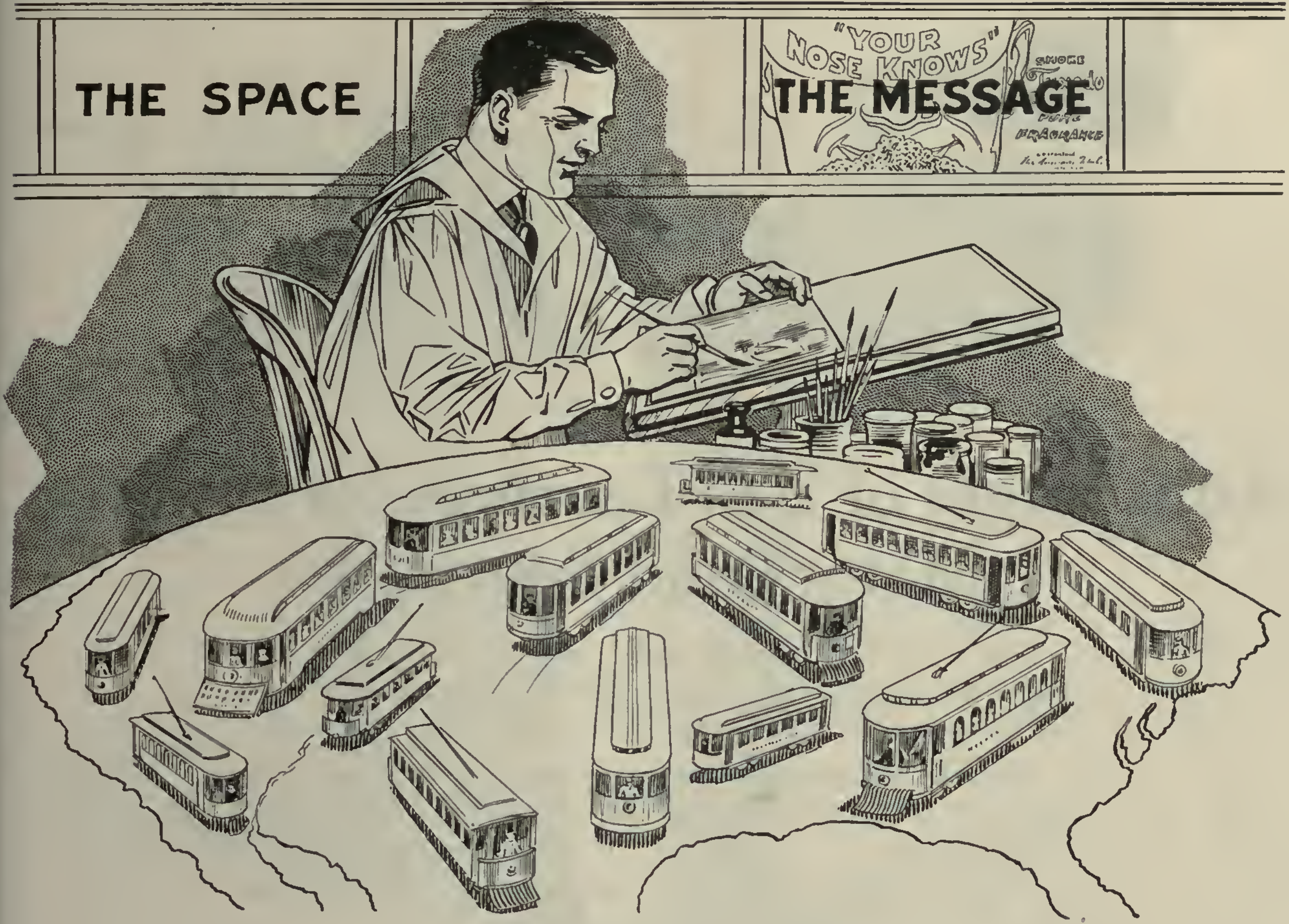

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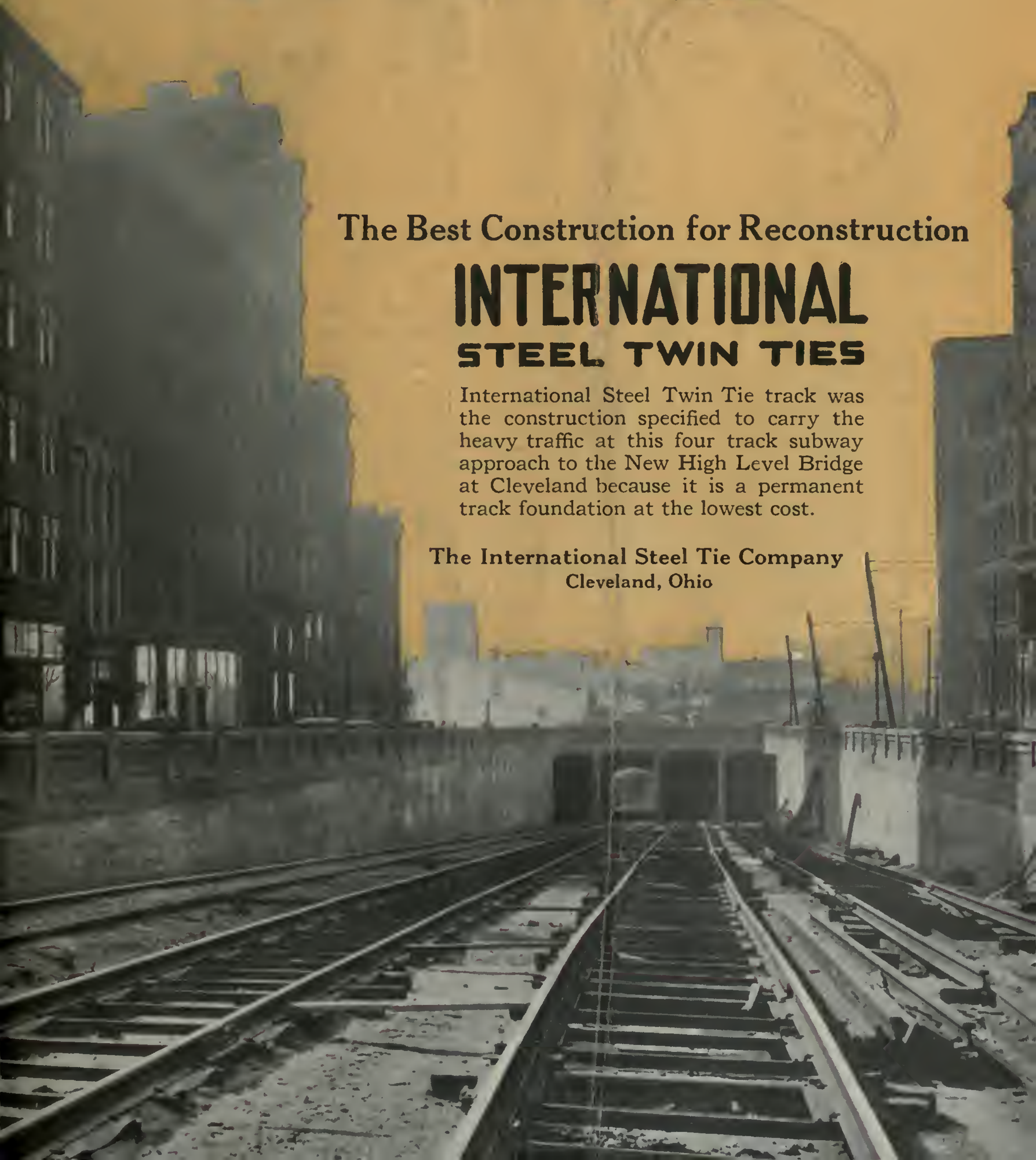

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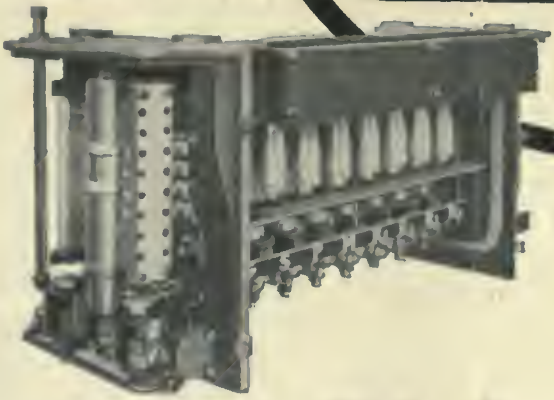

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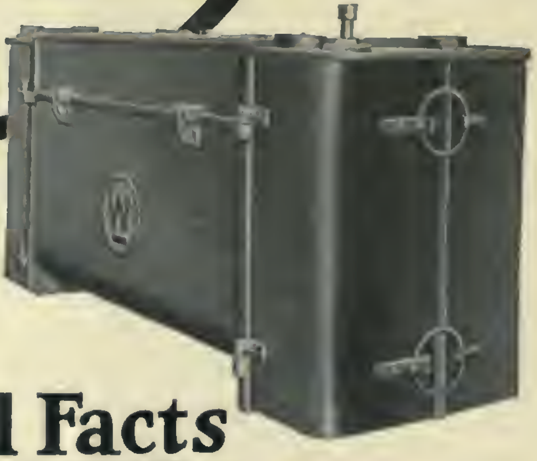

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Electric Railway Journal

H. W. BLAKE, *Editor*

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Our Attica Works-

The building of Westinghouse Stokers is not a side issue.

Stokers are the one product of a separate factory and a separate engineering organization located at Attica, N. Y., with Sales Offices in East Pittsburgh.

In addition, Westinghouse Stokers are of three distinct types—Underfeed, Roney and Chain Grate—each with its own field of application, and together covering the entire field of coal burning.

The choice of a stoker always narrows down to a study of plant requirements.

We make our recommendations. The choice of type is left to you.

Westinghouse Electric and
Manufacturing Co.
East Pittsburgh, Pa.

WESTINGHOUSE ELECTRIC

You Can Use Safety Car Control Equipments in the Largest Cities

Fitting up either your new or old cars with Safety Car Control Equipments is just the same as adding safety speed-up and labor-eliminating devices to a machine tool.

With our equipments on a **small** car, you can operate with one employee—man or woman—**all the time** on any headway likely to be met in cities below 100,000 population.

With our equipments on a **large** car, you can operate with one employee **sixteen hours out of twenty** in cities of **any** size.

Every purchaser of Safety Car Control Equipments is a booster for them. May we state the reasons?

SAFETY CAR DEVICES CO.

Main Office—Boatmen's Bank Bldg., ST. LOUIS

CHICAGO
Railway Exchange Bldg.

NEW YORK
City Invest. Building

PITTSBURGH
Westinghouse Building

CANADA—Canadian Westinghouse Co., Ltd., Hamilton, Ont.

Exceptional Products

Keystone Steel Gear Cases

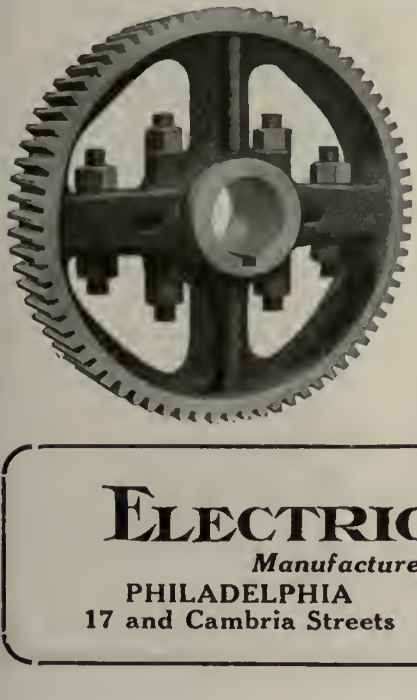
Gear cases must be built of steel of unquestioned strength, unaltered in quality during construction and made to fit exactly the foundations where they are to be installed. And, too, the brackets must be just right and the entire case must be both riveted and electrically spot-welded.

You can get some of these requirements in any gear case, but to get them all in one—you'll use the Keystone.

Keystone Trolley Catchers

Watching the trolley pole and catching it when it "flies" is the work of the Keystone Trolley Catcher. It earns its value over and over again, for each time the pole starts to fly—one less "weak spot" in your overhead can be credited to the Keystone.

Keystone Catchers are the simplest and strongest. You'll see them on the cars of most large railways.



Nuttall Gears and Pinions

Standard and special types of gears for railways, or any kind of a gear or pinion, forged or cast steel, split or solid and of various processes of manufacture to meet varying conditions of service. Put your gear problems up to us—we'll take full responsibility.

Eastern Agents for Nuttall-Pittsburgh.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA	PITTSBURGH	NEW YORK	CHICAGO
17 and Cambria Streets	337 Oliver Building	50 Church Street	Monadnock Building

Front Side

Type W—Surface Mounting
Cast Iron Case
Metal Reflector—Sterling Ray

Front Side

Type Z—Flush Mounting
Cast Iron Case
Metal Reflector—Sterling Ray

Front Side

Type WDF—Flush or Surface Mounting
Pressed Steel or Cast Iron Case
Mirror Reflector for Gold Ray or Crystal Ray.
or Metal Reflector for Sterling Ray.

Imperial Headlights for Safety Cars

Here are the three Imperial Headlights which have proved so successful on many Safety Cars.

They are sturdy compact equipments—on duty all the time.

Types W and Z are primarily for city service. They are equipped with 23 to 56 Watt regular filament Mazda lamps, but can be arranged to take 23 to 94 Watt concentrated lamps. With the latter the light source is in better focus, consequently the beam is considerably more powerful—suitable for unlighted or poorly lighted sections.

When the car runs through considerable distances where the lighting is poor the WDF is frequently used. It can be equipped with mirror reflectors for Gold Ray or Crystal Ray and uses a concentrated filament lamp.

Whatever your requirements, a Crouse-Hinds Imperial Headlight—Incandescent, Luminous Arc or Carbon Arc—will fill them exactly.

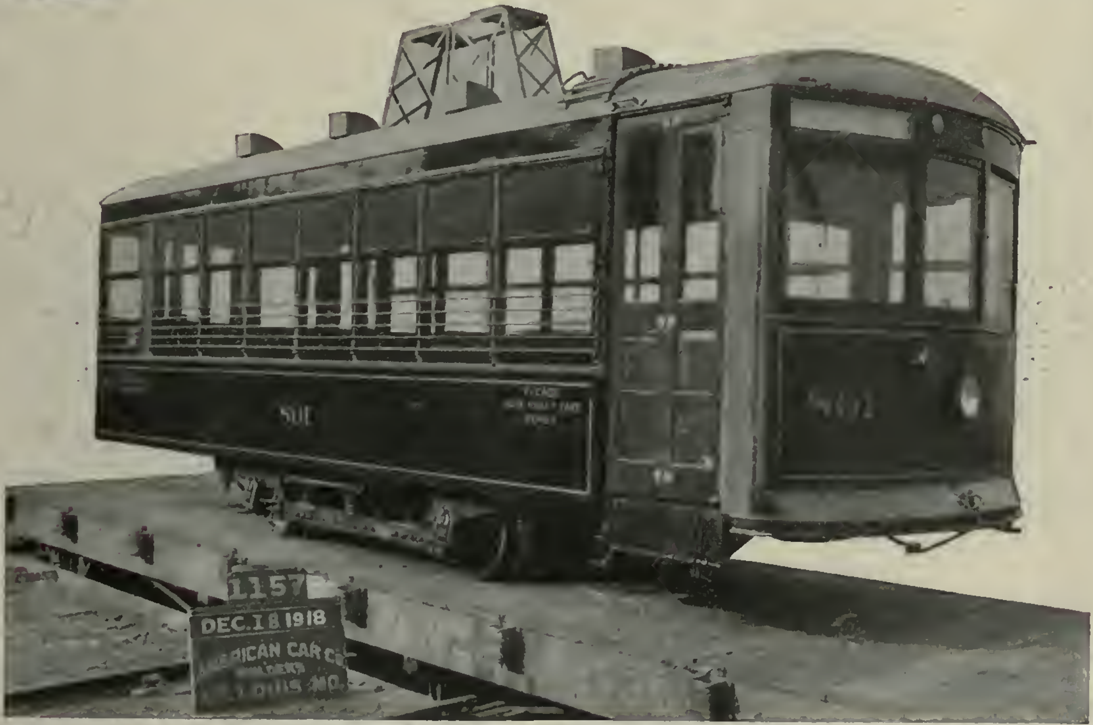
THE OHIO BRASS COMPANY, Mansfield, Ohio

New York Philadelphia Pittsburgh Chicago Los Angeles San Francisco

General Sales Agents in the United States for Crouse-Hinds Imperial Headlights

PRODUCTS

Quality First



O-B Trolley Catcher—Imperial Type W Headlight

Ready for Portland

This car was built for Portland, Oregon, and equipped with O-B Trolley Catcher and Crouse-Hinds Imperial Headlight.

Portland knows the safety car will make good as it has in other cities.

Portland knows the O-B Catcher and Imperial Headlight will make good not only because they have in other cities, but because they have already made good in Portland.

THE OHIO BRASS COMPANY, Mansfield, Ohio

New York Philadelphia Pittsburgh Chicago
Los Angeles San Francisco

Phono-Electric
Makes Miles of Curves at Seattle

The Puget Sound Electric Railway, Light & Power Company has used Phono-Electric Trolley Wire since 1911. In one year alone some 4.25 miles of Phono-Electric were bought for installation (in lengths of 100 feet or less) on curves exclusively. That is especially significant because it is on curves that any weakness would soon tell.

Phono-Electric Trolley Wire is always willing to meet the test of

The Worst Places First

Bridgeport Brass Company
Bridgeport Connecticut

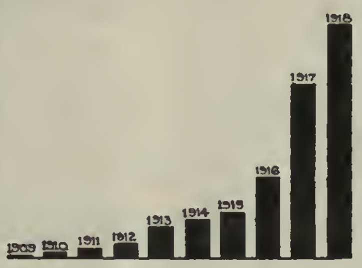
1077

Do You Know the Labor Problem Answer?

The answer is told by the tremendous increase in the use of railroad motor cars throughout the charted years, as shown below. Motor cars always have proven to be a distinct and very valuable investment.

The actual or visible money saving through the use of motor cars is not to be considered alone.

Contentment of motor transported employes, plus the ability to attract and keep a better class of labor has been a potent factor, too.



Ten Years Growth

Displacement of the old hand car with motor driven types is general practice on all large lines.

The proper model to select and the best methods to employ in handling cars are two problems with which we can be of much help.

The above chart shows only the steady, sturdy growth of Mudge Motor Cars in service. It is indicative of the splendid results Mudge Cars are giving to an ever lengthening list of satisfied railroad buyers.

Write for Complete Set of Motor Car Specifications.

MUDGE
MOTOR CARS

MUDGE & COMPANY. 443 Railway Exchange, Chicago, Illinois

Anderson Slack Adjusters

for Single Truck Cars

Thousands of single-truck street cars can now be equipped with Anderson Automatic Slack Adjusters and thus secure the following advantages—

Elimination of all manual brake adjustment except the replacement of worn shoes.

All brakes are adjusted alike and uniform setting is maintained.

Decreased brake shoe wear.

Less current used by dragging of brakes.

Decreased armature maintenance and fewer pull-ins for bad armatures and brakes.

Motormen better satisfied by having all cars brake alike and thus reduction of collisions.

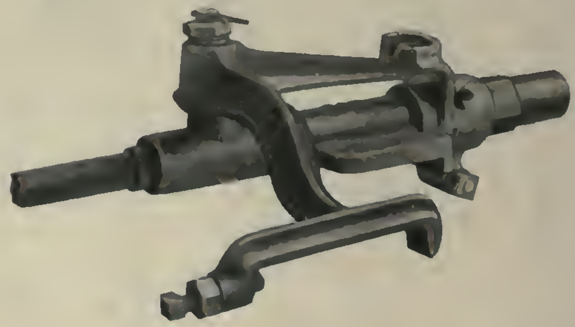
These Anderson Adjusters are designed for popular styles of single truck cars.

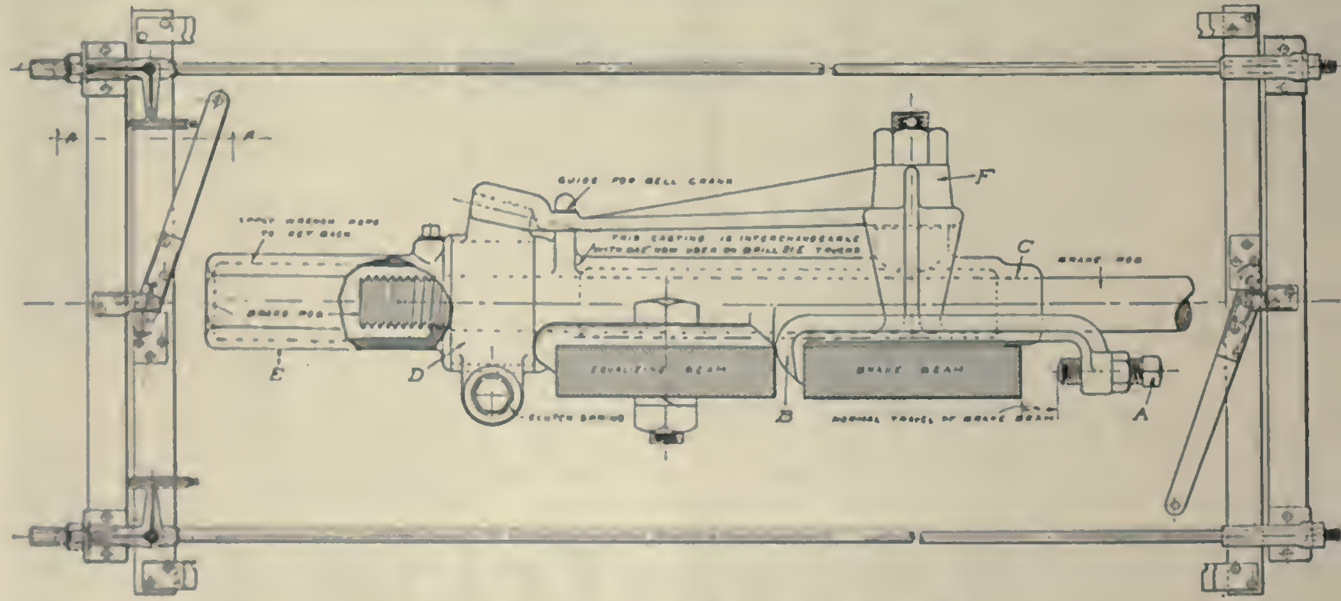
Circular showing method of installation and explaining operation will be mailed on request

Brill 21-E

Taylor, Peckham

St. Louis




GUIDE FOR BELL CRANK
F
THIS CASTING IS INTERCHANGEABLE WITH ONE NOW USED ON BRILL 21E TRUCKS
C
BRAKE ROD
BRAKE ROD
EQUALIZING BEAM
BRAKE BEAM
E
D
CLUTCH SPRING
B
NORMAL TRAVEL OF BRAKE BEAM
A

Holden & White Inc.

817 Fisher Building, Chicago, Ill.

National Railway Appliance Co., New York and Washington; C. E. A. Carr Co., Toronto, W. M. McClintock, St. Paul; Alfred Connor, Denver; F. F. Bodler, San Francisco; S. I. Wailes, Los Angeles; L. Brandenburger, Salt Lake City

SAMSON

SPLICERS

They stay up.
Non-arcing.
No hard spots in trolley.
Stronger than wire.
Cost least per car mile.
Easy to install.

For "Service Efficiency" in any overhead material specify "Drew." Catalog for reference sent free on request. Ask for it.

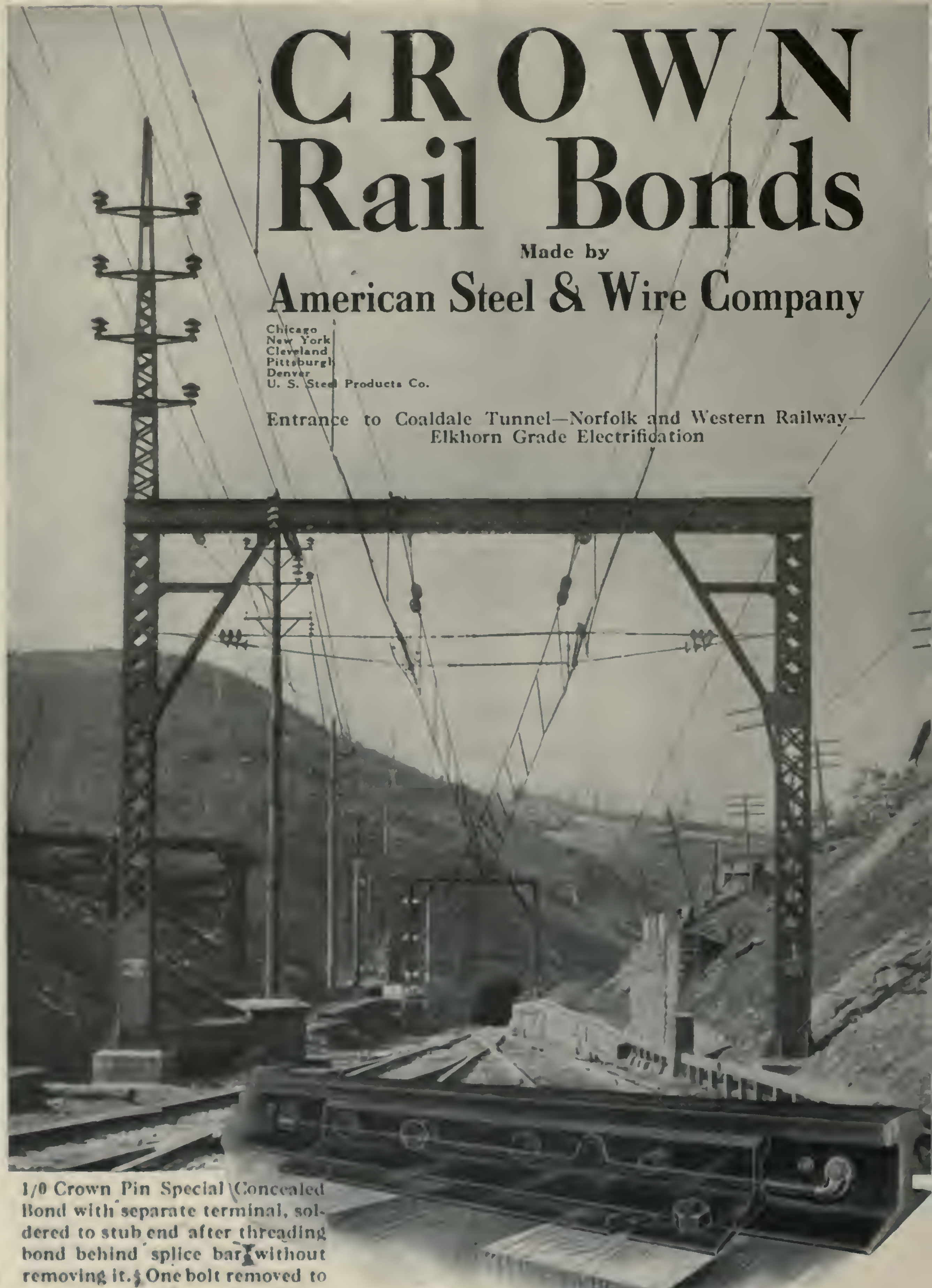
DREW ELECTRIC & MFG. CO.
1016 E. Michigan St., Indianapolis, Ind.

District Representatives:

Holden & White, Inc., 343 S. Dearborn St., Chicago, Ill. Brown & Hall Supply Co., 1515 Pine St., St. Louis, Mo. Railroad Signal Supply Co., Hackney Bldg., St. Paul, Minn. Wm. F. McKinney, 54 First St., Portland, Ore. Frank F. Bodler, 903 Monadnock Bldg., San Francisco, Cal. Engineering & General Supply Co., 400 San Fernando Bldg., Los Angeles, Cal. Alfred Connor, Majestic Bldg., Denver, Colo. Wm. M. Lawyer, 383 Fayette St., Syracuse, N. Y. Goldschmidt & Forbes, Inc., 90 West St., New York, N. Y. H. S. Salt (Export Agent), 114 Liberty St., New York, N. Y.

Canadian Representatives:
Northern Electric Co., Ltd., 121 Shearer St., Montreal, Quebec.

DREW
MEANS "SERVICE EFFICIENCY"



CROWN Rail Bonds

Made by

American Steel & Wire Company

Chicago
New York
Cleveland
Pittsburgh
Denver
U. S. Steel Products Co.

Entrance to Coaldale Tunnel—Norfolk and Western Railway—
Elkhorn Grade Electrification

1/0 Crown Pin Special Concealed Bond with separate terminal, soldered to stub end after threading bond behind splice bar without removing it. One bolt removed to permit passage of expansion crimp

Simple, Isn't It ?

Before

After

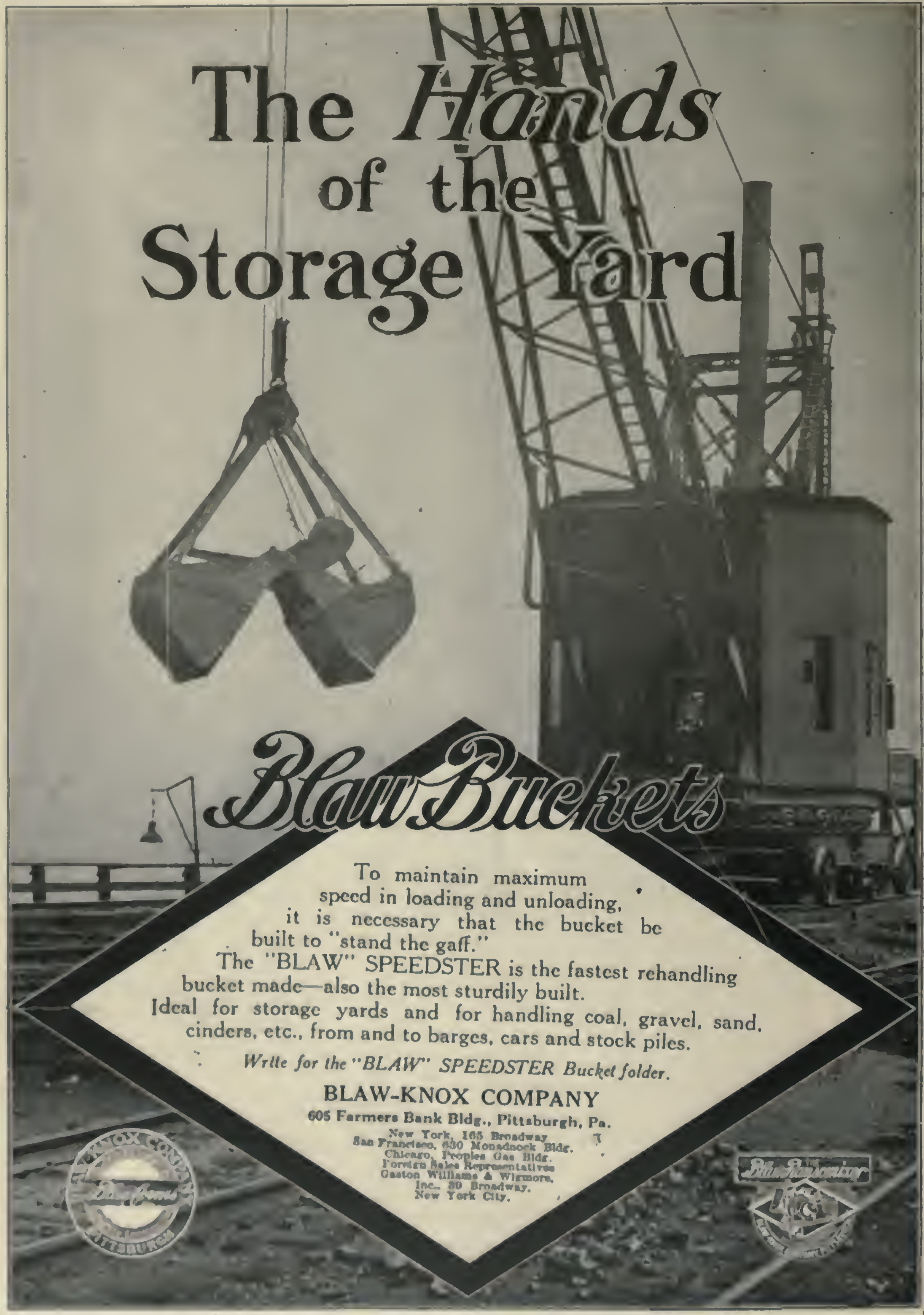
There is no need of laying NEW Rails

—If you will rebuild the
old ones with the

Indianapolis Welder

In spite of temporarily depressed conditions in the Electric Railway field, common sense and farsightedness demand that the trackwork and other equipment necessarily neglected during the war be put back into that "85% new" condition which experts consider excellent maintenance. But financial considerations dictate that it shall be done at **minimum expense**—and this is accomplished by the Indianapolis Welder. Any man with ordinary intelligence can quickly build up the weak spots in your old rails, frogs, switches, cross-overs, joint-plates, etc. This portable electric welder also makes electrically welded instead of bolted joints, which show greater conductivity than the rail itself. **The investment is low**—let us put all the facts before you.

Indianapolis Switch & Frog Co.
Springfield, Ohio.



To maintain maximum speed in loading and unloading, it is necessary that the bucket be built to "stand the gaff."

The "BLAW" SPEEDSTER is the fastest rehandling bucket made—also the most sturdily built.

Ideal for storage yards and for handling coal, gravel, sand, cinders, etc., from and to barges, cars and stock piles.

Write for the "BLAW" SPEEDSTER Bucket folder.

BLAW-KNOX COMPANY
605 Farmers Bank Bldg., Pittsburgh, Pa.
New York, 165 Broadway
San Francisco, 630 Monadnock Bldg.
Chicago, Peoples Gas Bldg.
Foreign Sales Representatives
Gaston Williams & Wigmore,
Inc., 80 Broadway.
New York City.

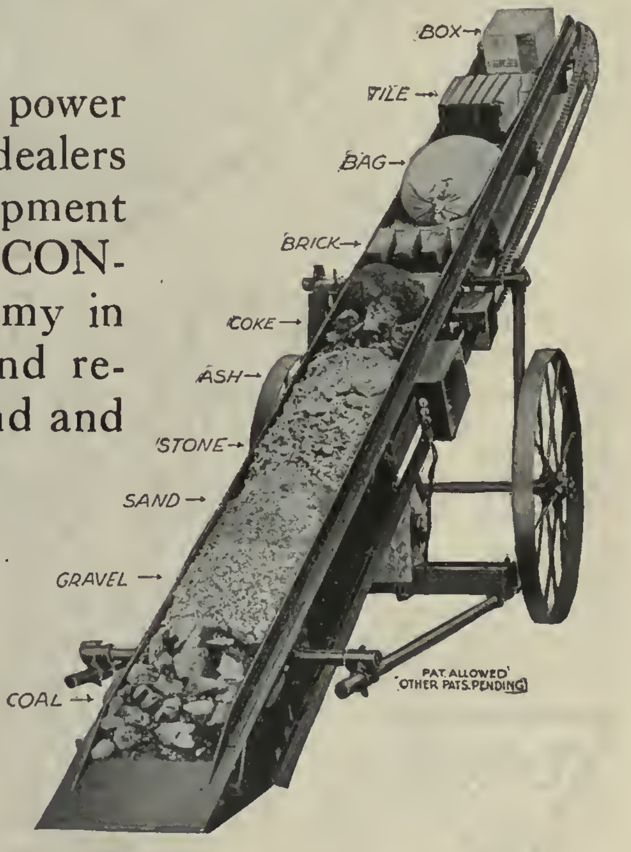
The SCOOP CONVEYOR

Over 1000 leading factories, power plants, contractors and coal dealers have found that no other equipment can compete with the SCOOP CONVEYOR for speed and economy in loading, unloading, storing and reclaiming coal, coke, gravel, sand and similar materials, bags, boxes, crates and bulky packages.

It takes the place of six to twelve men and reduces the "idle time" of other equipment.

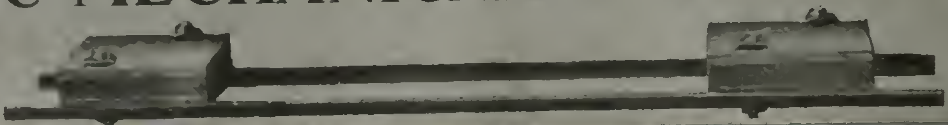
Is power driven and portable.

Write for Illustrated Literature.



Portable Machinery Co., Inc., Passaic, N.J.

The MECHANICAL RAILWAY TIE



A Trial Installation Of the Dayton Rail Joint Booster Will Convince You of its Efficiency

We know just what the Dayton Rail Joint Booster will do. We know it provides a positive means for correcting low rail joints quickly, effectively and economically. We've seen joints that looked hopeless fully rehabilitated by its simple use.

It will pay every man interested in maintenance of tracks to make a test installation.

Order a Dayton Rail Joint Booster today. Install it, in accordance with the complete instructions which will accompany it, under the very worst rail joint in your tracks. Its effectiveness will convince you that it will pay you to use Dayton Rail Joint Boosters exclusively for rehabilitating sunken and uneven rail joints.

THE DAYTON MECHANICAL TIE CO.
201 Third Street Arcade
DAYTON, OHIO

1. Applying Molasses to Asbestos Strips for Luting between Edge of Mold and Rails.

2. Applying Asbestos and Molasses Strips to Rails previous to Adjusting Mold.

3. Adjusting Two-Part Mold to Rails.

What is the difference between a welded rail joint and a THERMIT Weld?

In a merely *welded* joint, the fissure between the rails is only *partly* obliterated. The joint is still weaker than the rail itself. The return circuit is retarded.

In a THERMIT Weld the rail joint ceases to exist. *It is obliterated.* The union of rails is 100% efficient, both mechanically and electrically. The resistance to the return circuit is reduced. Electrolytic damages are prevented. Years are added to the life of the track. And the cost is lowest in the end.

Allow us to send Catalog 1232—or to send a representative to discuss the matter more fully.

Metal & Thermit Corporation

120 Broadway, New York

Successors to

Goldschmidt Thermit Co., Goldschmidt Detinning Co.

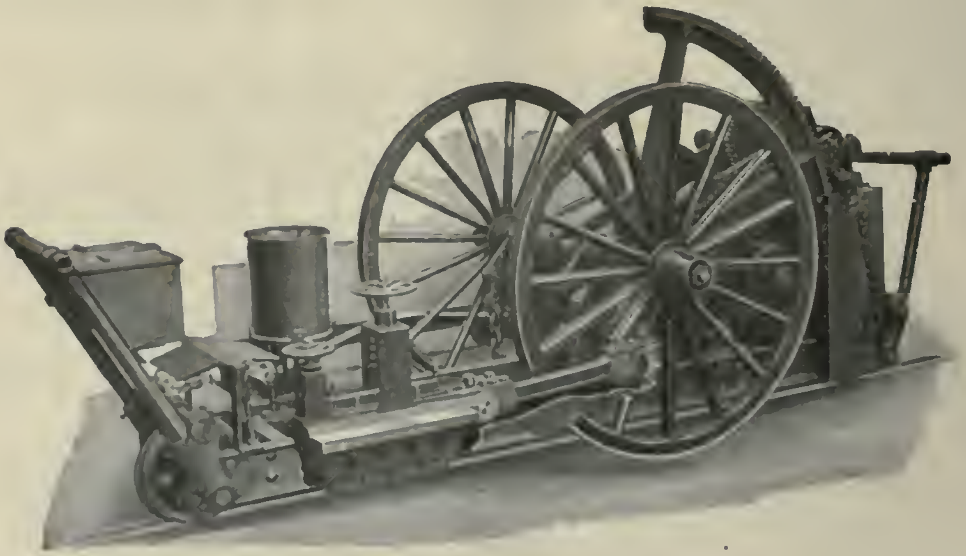
Branch Offices and Shops: 1427 Western Ave., Pittsburgh, Pa. 7300 So. Chicago Ave., Chicago. 329 Folsom St., San Francisco. 15 Emily St., Toronto, Ont. Factories: Chrome, N. J. Wyandotte, Mich. East Chicago, Ind. Jersey City, N. J.

4. Mold and Crucible Compound in position ready for preheating—box containing Thermit additions.

5. Preheating Rail Ends. Heating Thermit additions and baking mold in one operation.

6. Finished Thermit fully welded. Insert Rail Joint.

Your Positive Security of Satisfaction



Reciprocating Track Grinders

are sold on their performance in service.

The buyer of these machines is absolutely sure that the economies and satisfaction he expects from the Reciprocating Grinder are going to be delivered. He is secure in this knowledge for three reasons:

First—Our well-known sales policy of putting a machine in service with the understanding that there is no obligation whatever on the part of the railway company to buy the machine unless the company definitely decides to that effect after a full opportunity to judge the value of the machine and its work on the railway company's own tracks.

Second—The fact that the Reciprocating Grinder is in satisfactory use with more than 100 of the leading electric railways throughout the world.

Third—The simplicity and ruggedness of the design and construction of the machine itself.

We are ready to put a Reciprocating Grinder on your tracks and let you be the judge of its value to you.

RAILWAY TRACK-WORK COMPANY

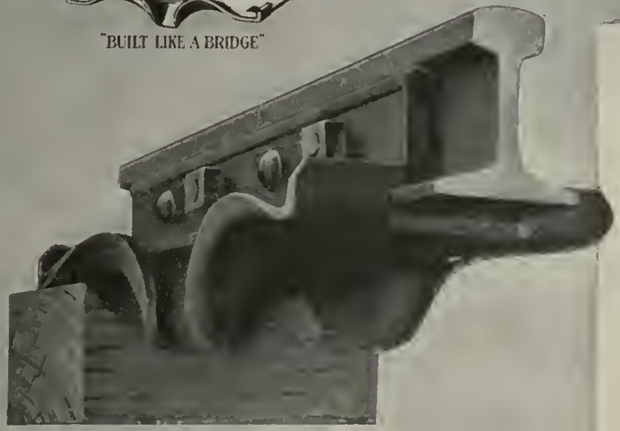
30th and Walnut Streets, Philadelphia

Abbott Rail-Joint Plates

—Primarily a joint support, but also a decided step toward

SAFETY FIRST

The ABBOTT RAIL JOINT PLATE
"BUILT LIKE A BRIDGE"



THE upturned corner lugs, locking the ends of the angle bars, prevent the joint from creeping.

Through contact with edges of the rail base, they also act as guides to preserve rail alignment if through accident or otherwise the angle bars break or come loose.

Further, the inward extension of the two lugs on the gage side of the rail to form hooks over and engage the rail base, arrest vertical motion or overturning of the rail.

The "Safety First" feature, prevention of wear and breakage, preservation of smooth-running track surface, protection to ties, decrease of maintenance, labor—all help to make Abbott Plates a splendid investment.

Ask for our booklet *"Improved Track Appliances."*

290

Lackawanna Steel Company

LACKAWANNA, N. Y.

ATLANTA CHICAGO DETROIT ST. LOUIS
BOSTON CINCINNATI NEW YORK SAN FRANCISCO
BUFFALO CLEVELAND PHILADELPHIA HAVANA

INSTALL THE "FRANKLIN" AND FORGET IT!
ELECTRICAL DEVELOPMENT AND MACHINE CO.
TRADE MARK
GENERATING STATION EQUIPMENT

Announcing The New "Franklin" Fuse

HERE, at last, is the non-destructive, renewable fuse.

WITHOUT injury to its container, or to the fuse box and its surroundings, it is absolutely positive in opening high capacity short circuits.

NO flash, no flame, no violent action accompanies its blowing.

Of course, these important results in operation are obtained only by reason of radical departures from existing designs.

The fuse-box is of light skeleton construction with panels of asbestos lumber. If desired, the fuse may be withdrawn from the circuit by opening the door.

Explosions due to the rupturing of high capacity short circuits are so completely absorbed that it has been possible to seal the fuse in a tight container, so that flaming gas cannot escape.

SELLING AGENTS
**THE PHILADELPHIA ELECTRIC
COMPANY SUPPLY DEPT.
132 South Eleventh Street
Philadelphia**

"FRANKLIN
FUSE"

This Electric Railway has a servant who can lift 15 tons

The Milwaukee Ry. & Light Company is the name of his employer.

The TOLEDO CRANE is the name of the employee.

Look up the payroll and you will see that since his first salary was paid hardly a cent has been paid out further.

Look at the shop records and you will see how well this Toledo serves his masters—how he has speeded up handling — cut costs — enabled fewer men to do greater work.

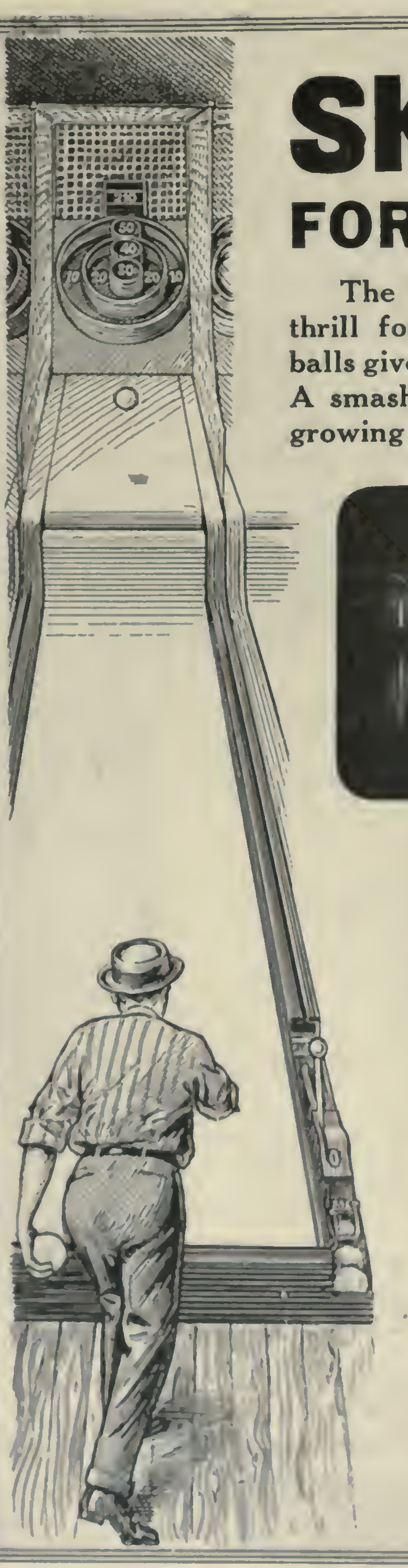
Do you want such a servant?

The Toledo Bridge & Crane Co.

Toledo, Ohio

New York Office, 52 Broadway
Philadelphia Office, 2013 Market St.
Pittsburgh Office, 203 Oliver Bldg.

Cleveland Office, 725 Citizens Bldg.
Chicago Office, 549 Washington Blvd.
San Francisco Office, Rialto Bldg.



SKEE BALL

FOR TROLLEY PARKS

The Bowling Game with a Punch that has a thrill for player and spectator alike. The leaping balls give a life to the game that no crowd can resist. A smashing big success for five years and daily growing stronger.

In 1917 the PHILADELPHIA RAPID TRANSIT COMPANY installed in their WILLOW GROVE PARK 5 SKEE-BALL Alleys. SKEE BALL became popular immediately, and alleys earned more than twice their cost during the season. Last year the TRACTION COMPANY installed 5 additional games. The 5 SKEE BALL Alleys during 1917 and the 5 additional alleys during 1918 earned together over $12,250.

SKEE BALL will earn just as much per alley in any good ELECTRIC TRACTION PARK and will continue one of the most popular and active features a Traction Company can install.

A number of Electric Railway Companies who own their Trolley Park have from two to ten SKEE-BALL Alleys in profitable and successful operation.

Write for Illustrated Catalogue.

It will be wise to order alleys two months before opening the park season.

The J. D. Este Company
Owners—Patentees—Distributors
1536 Sansom Street, Philadelphia

Just a Car Cashier *because of*

National Pneumatic Door and Step Control

All reasonable objections to women conductors is removed when you equip your cars with National Pneumatic Door and Step Control.

For all that is then necessary to open and close the doors quickly, positively and safely is to push a button, turn a lever or press a pedal as you desire.

The National Pneumatic engines do all the *work;* the conductress does all the *thinking.* Her job is simply that of a car cashier at better than mercantile wages.

Here is the way to settle the problem of putting the *selling* idea on street cars!

NATIONAL PNEUMATIC COMPANY
INC.

50 Church St. New York

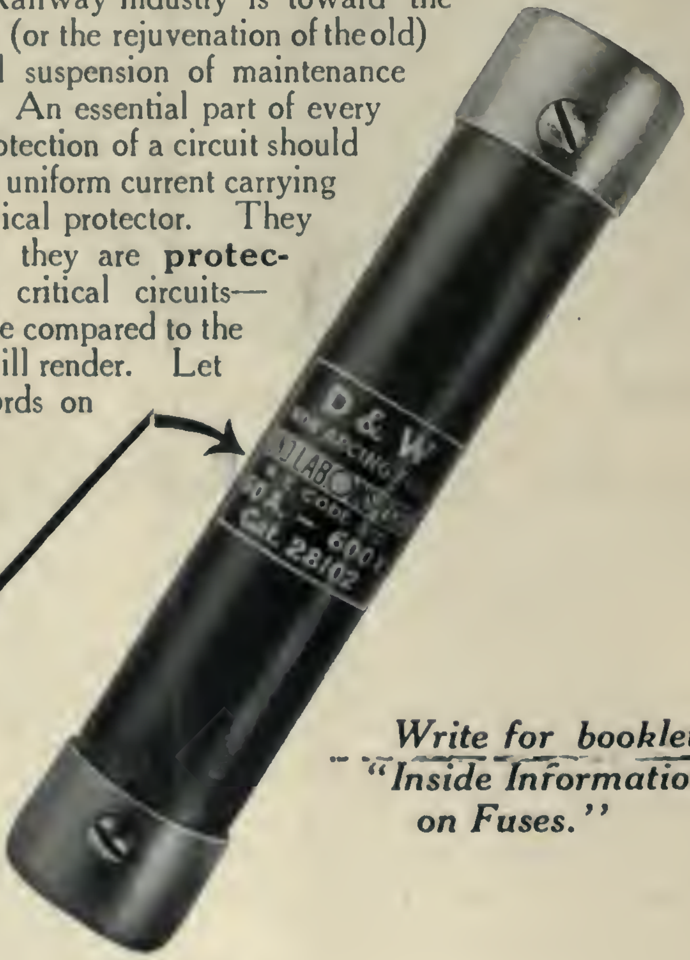
515 Laflin St. Chicago

D & W FUSES

BUYING NEW EQUIPMENT?

Now is the time to invest in "D & W" FUSES

The trend of the Electric Railway Industry is toward the purchase of new equipment (or the rejuvenation of the old) to atone for the practical suspension of maintenance during the past few years. An essential part of every equipment involving the protection of a circuit should be "D & W" Fuses. Their uniform current carrying capacity make them the logical protector. They are more than "enclosed" they are **protection insurance** for the critical circuits—hence their cost is negligible compared to the value of the service they will render. Let us lay before you their records on roads all over the country.



For Full Protection
Look For This Label

Write for booklet, "Inside Information on Fuses."

DELTABESTON WIRE
REG. U.S. PAT. OFF.

D & W Fuse Company
Providence R.I.
U.S.A.

D&W
REG. U.S. PAT. OFF.

THE STANDARD
FOR
SERVICE

DAVIS STEEL WHEEL

Slid-flats are scarce among Davis Wheels. That hard tough manganese steel tread is the reason.

AMERICAN STEEL FOUNDRIES
NEW YORK CHICAGO ST. LOUIS

NOW! NOW! NOW!

Now is the time to sell machinery and material to the industries curtailed during war time. Equipment offered *now,* gets the benefit of present market prices and *immediate* demands.

You can reach the big buyers in the electric railway field through

The Searchlight Section of Electric Railway Journal

"Searchlight" advertising is the big factor of recent years in the sale and exchange of used machinery. Buyers and sellers use it to equally good advantage:

During war times it helped both government departments and private buyers to obtain necessary equipment; it enabled one advertiser to sell $4,800 worth of machinery through advertising that cost $12; another sold equipment for double the price he expected to get for it; another sold equipment through "Searchlight" advertising in less than a month, that has already been offered through other channels for over 8 months.

If YOU have surplus equipment on hand, NOW is the time to sell it—through the "Searchlight."

SEARCHLIGHT
SERVICE
SECURES
SATISFACTORY
SALES

An officer on board a warship was drilling his men.

"I want every man to lie on his back, put his legs in the air, and move them as if he were riding a bicycle," he explained. "Now commence."

After a short effort, one of the men stopped.

"Why have you stopped, Murphy?" asked the officer

"If ye plaze, sir," was the answer, "Oi'm coasting."—*Pittsburgh Chronicle-Telegraph.*

Murphy Had the Right Idea

Before the war he had evidently been a motorman operating trolley cars equipped with Arthur Power-Saving Recorders.

He believed in shutting off the power as soon as possible.

And that is the idea which your motormen will get and keep when they constantly have had experience on the

Arthur Power-Saving Recorder

with its continuous record of "power on" time.

A power saving campaign utilizing the Arthur Recorder pays big dividends to the electric railway company in saving of coal—saving of brakeshoes and other car equipment —safety of operation.

The Arthur Power-Saving Recorder Company
Second National Bank Building, New Haven, Conn.

The best-laid plans sometimes are changed
by unexpected developments

FOR EXAMPLE:—

The midwinter meeting of the American Electric Railway Association was set for March 14th.

So of course the March 15th issue of the Journal will have to carry a complete report of the proceedings. Newspaper speed—as usual.

But March 15th was the date set for our Annual Maintenance Number.

This requires a quick change of plans. So the

Maintenance Number

will be dated March 22

It will also be the special monthly Mechanical and Engineering edition (instead of the third issue of the month) with its added circulation in the mechanical departments.

Which offers a double opportunity for profitable publicity that your sales department will welcome.

Millions for Maintenance

are expended by America's electric railways. Even during times when financial burdens weigh heavily upon the industry, maintenance work must go on.

The next few months will see much of this year's work under way.

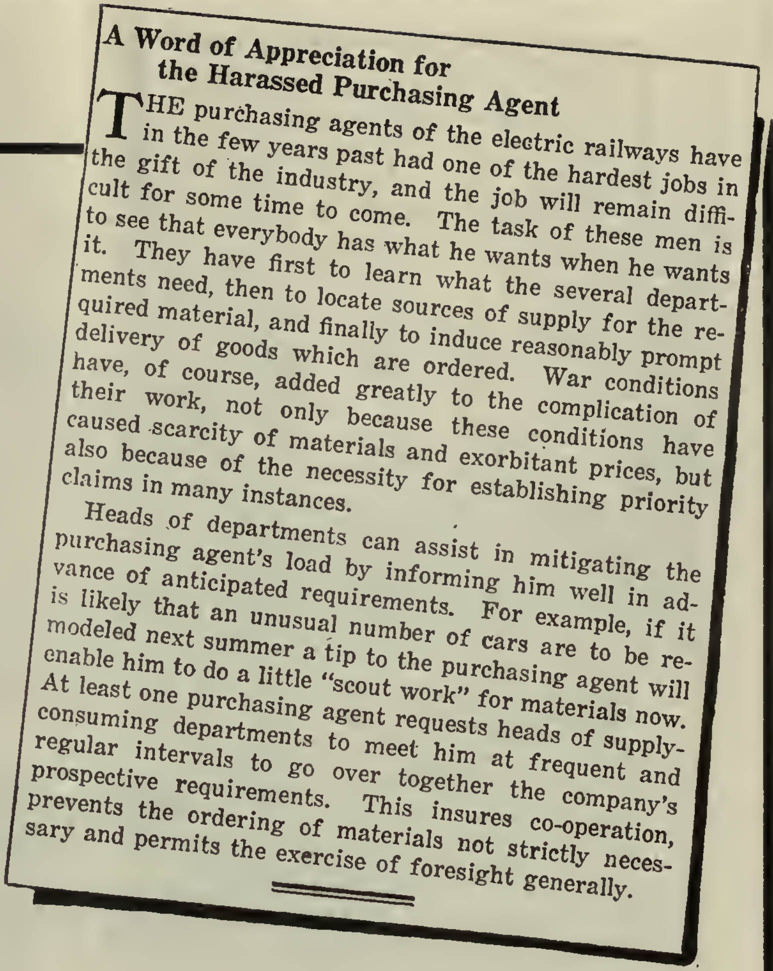
The men who decide what methods, materials, equipment and supplies shall be selected base their choice largely on what they read in the Annual Maintenance Number of the Electric Railway Journal. That is why the most experienced and successful manufacturers regularly use this issue for prominent display advertising.

Get your space reservation to us early.

TODAY'S THE DAY!

Rates from $100 a page to $60 a page, according to amount of space used or your contract rate if you are a regular advertiser.

Electric Railway Journal, Tenth Avenue at 36th Street, New York



A Word of Appreciation for the Harassed Purchasing Agent

THE purchasing agents of the electric railways have in the few years past had one of the hardest jobs in the gift of the industry, and the job will remain difficult for some time to come. The task of these men is to see that everybody has what he wants when he wants it. They have first to learn what the several departments need, then to locate sources of supply for the required material, and finally to induce reasonably prompt delivery of goods which are ordered. War conditions have, of course, added greatly to the complication of their work, not only because these conditions have caused scarcity of materials and exorbitant prices, but also because of the necessity for establishing priority claims in many instances.

Heads of departments can assist in mitigating the purchasing agent's load by informing him well in advance of anticipated requirements. For example, if it is likely that an unusual number of cars are to be remodeled next summer a tip to the purchasing agent will enable him to do a little "scout work" for materials now. At least one purchasing agent requests heads of supply-consuming departments to meet him at frequent and regular intervals to go over together the company's prospective requirements. This insures co-operation, prevents the ordering of materials not strictly necessary and permits the exercise of foresight generally.

Elec. Ry. Journal

A Tip to the Purchasing Agent

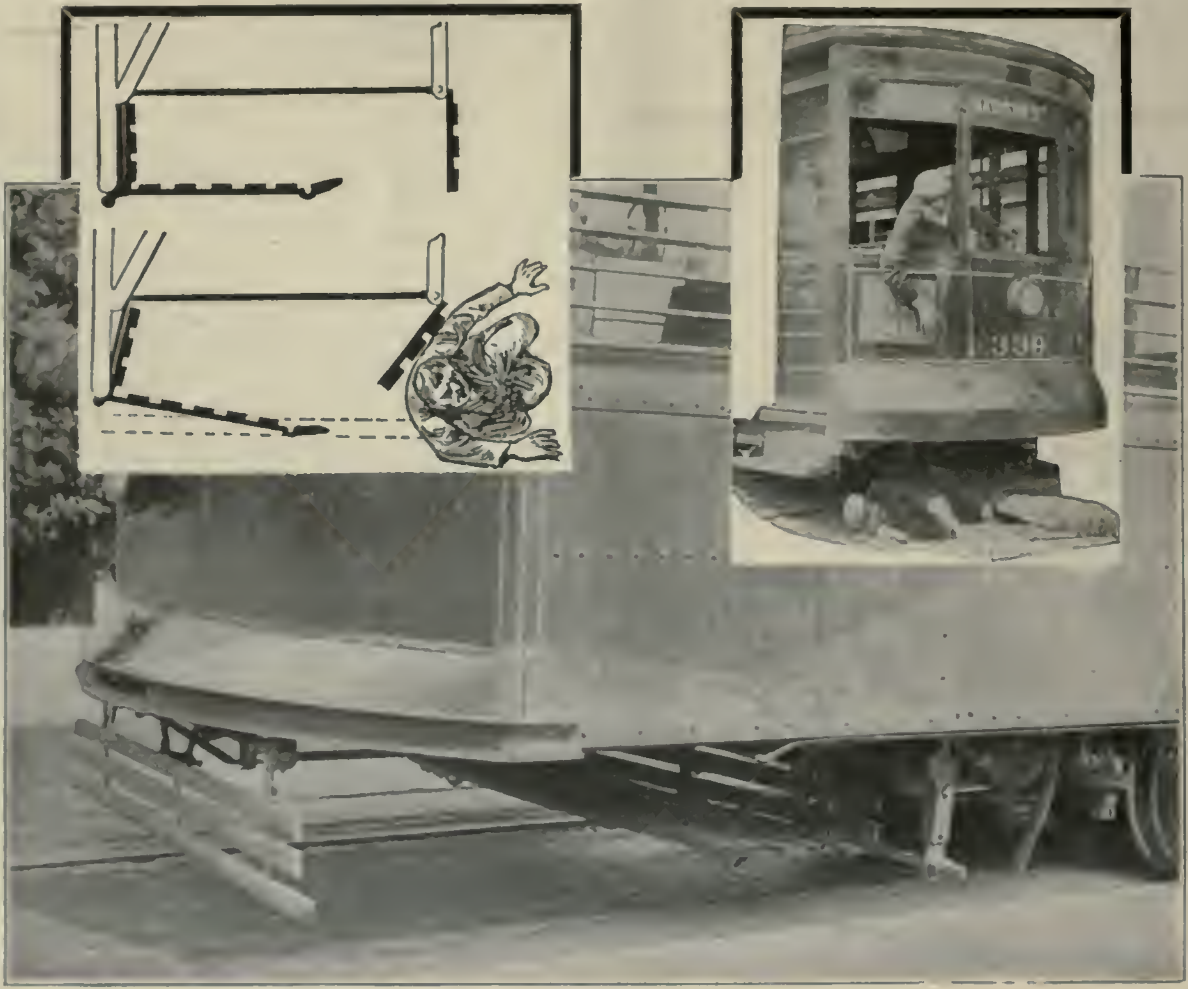
We realize *your* troubles. Here's *one* answer. Make a note now that a reliable source of supply for prompt shipment of *reliable* Insulating Products is IRVINGTON. You can get

Irvington Black Varnished Cambric

—and Irvington oiled silk, flexible varnished tubing, special paper for coil windings and black and yellow insulating varnishes — *"what* you want *when* you want it." And you can be CERTAIN of high resistance, high dielectric strength, and that the insulation will be non-hygroscopic, chemically neutral and heat resisting. If you will secure *now,* from your department heads, approximate data on your needs, and let us know, we will promptly send samples and further information. FORESIGHT!

Irvington TRADE MARK

IRVINGTON VARNISH & INSULATOR Co.
Irvington, New Jersey.



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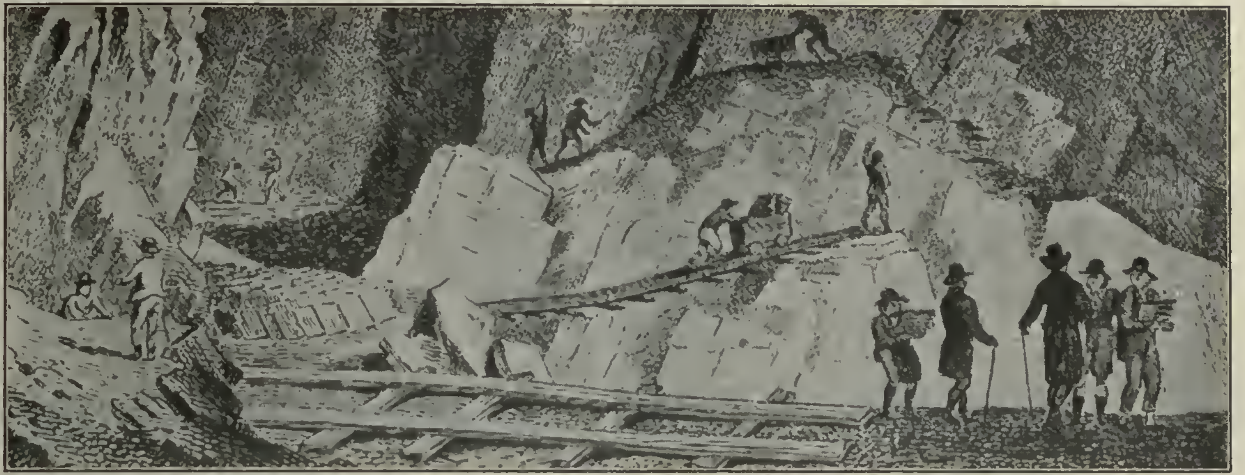

Railways had their origin in tramways or wooden wagonways used in the sixteenth century for conveying coal near Newcastle, England. In time the wooden rails were covered with a thin sheet of iron. Iron wheels were introduced about 1734 and the first cast-iron rail appeared about 1767.

The Rapid Progress Made in Transportation

is instantly suggested by the picture of this old tramway. One hundred and fifty years elapsed between the time this crude equipment was used and the date of the inauguration of the first American electric railway.

It is a period of only about 30 years from the date of the first electric car in America to the comfortable, high-speed, efficient electric car of today.

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Electric Railway Journal

Consolidation of STREET RAILWAY JOURNAL and ELECTRIC RAILWAY REVIEW

Volume 53 New York, Saturday, February 15, 1919 *Number* 7

Welding Processes Have a Wide Field of Usefulness

ALL METHODS of welding received a tremendous impetus from the conditions which resulted from the recent war. The great demand for steel and iron, the difficulty of obtaining labor for maintenance repairs and the necessity for rapid repairs to equipment in order to keep the output up to the maximum were contributing causes. The electric railways of this country were hard hit by these conditions and have been extending the use of the various welding and cutting processes. Much of the repair work which was undertaken chiefly to keep cars and equipment in service has been found to result in real economies. Many of the methods, devised in war time, will be continued. Thus on one electric railway contact shoes which had always been scrapped when excessively worn have been repaired by cutting out the worn portion and welding in a new wearing plate. The cost of this method of repair was found to be approximately $1 less per shoe than the price originally paid for the new shoes, and this method of repair can be repeated several times before it is necessary to scrap the shoes for wear at other points. This railway will continue repairs of this class even should steel and iron prices reach the low level of prewar times.

In this accelerated development of welding the manufacturers of apparatus have joined with the practical men in a study of the problems, and the Emergency Fleet Corporation through its welding committee has assisted greatly. Some form of association for those interested in this art is highly desirable. As this issue goes to press we are advised that the formation of such a welding association is contemplated. It certainly would find much to do, as engineers in many fields are interested in advancing the welding art.

Any Eight-Hour Bill Should Exempt the Electric Railways

THIS is the open season for corporation baiting in the state legislatures. We are not surprised, therefore, to note that the perennial demand for an eight-hour day is being pressed by union labor lobbyists in various sections of the country. While the proposed legislation has no special reference to electric railway employees, we think it proper to remind the companies of this class to be on their guard. Nine-in-twelve or ten-in-twelve laws are baneful enough when applied to electric railway companies, but an eight-hour law which does not exempt utilities of this class will be a most serious matter for the average electric railway property. It will mean one of two things. If such legislation contemplates that eight hours work is the maximum that should be performed by any employee, the result for a utility corporation with its peak loads separated by more than eight hours will be a greatly augmented force of trainmen. Where these men are guaranteed a minimum day's wage the financial burden is likely to prove disastrous.

It appears, however, that the unions want a basic eight-hour day as the basis for a full day's wages with time and a half or double time for "overtime." The effect of such a measure on the hard-pressed electric railways would be no less distressing. Such legislation is not intended to meet the demands of reformers who are looking to the conservation of human energy. Its real purpose is to give a bonus to those employees whose duties cannot be properly performed in eight hours.

We do not here argue for or against a general eight-hour day. We simply call the attention of electric railway interests to the possible menace in the pending bills. The industry is already carrying its limit of the wage burden, and until its revenues are in better shape the public must be warned to block such legislation or any other measures which may add to the constantly growing list of electric railway receiverships. The public cannot afford to have these essential utilities crushed.

Good Salesmanship Needed in Promulgating Association Standards

THE most important task which lies before the American Electric Railway Engineering Association is in capitalizing the very considerable investment of time and money which has been made in preparing various association standards. This would seem to require the services of a vigorous committee, which would follow up the work of a similar committee appointed some years ago for the same purpose. In this work it should be borne in mind that standardization accomplishes its full purpose only when it does these three things: Fixes upon such devices as represent the best development in the art with due regard to the harmonizing of theoretical perfection with practicability. Secures the acceptance of the standards by the users of similar material. Secures the protection of the standard material by the manufacturers in place of a large number of similar devices.

Complaint has been heard to the effect that the manufacturers' catalogs of supplies for electric railways contain few references to A. E. R. A. standards in the way that M.C.B. and A.S.C.E. standards are referred to in the fields covered by the Master Car Builders' Association and the American Society of Civil Engineers respectively. This is, of course, due largely to the fact that electric railways seem not to want A. E. R. A. standard materials; otherwise the manufacturers would "play up" the fact that certain products comply with the association's standard specifications.

As a matter of fact, in many cases the stock designs of all the well-known manufacturers come well within the standard limitations. Under the circumstances such designs might well be cataloged as A. E. R. A. standard. If this were done many companies would be impressed by this heading, because they would know that the designs represent the best combined judgment of manufacturer and railway engineers.

Assuming then that the selections so far made for standardization have been wise ones, it behooves us all to push them so that the past work of the committees of the association may be conserved and future committees be encouraged to do even better work because sure of a better appreciation. Let's make them standards in fact as well as in name.

This Idea Is Not New But It Is Timely

EVERY electric railway needs one man, preferably the president or the general manager, who will spend a large part of his time studying the needs of the public, adapting the resources at command or obtainable to meet these needs, and explaining to the public the elements of the local transportation problem. A manager said to the writer recently that when he was in a subordinate position his chief criticism of the managers whom he knew was that they tried to do too much of the work that their subordinates were employed to do, while neglecting to get out among their patrons for the purpose of developing cordial relations between the railway and the public, individually and collectively. When he was appointed to a position in which he had a chance to apply his theory, he realized that it was "up to him" to do what he thought others should have done, and he has endeavored to carry out this policy, apparently with excellent results.

The above incident suggests that the duties of managers and other executives have changed in recent years. Time was when the head of an electric railway could know much of the detail of all departments, but as the complexity of the equipment and the organization has increased this condition has gradually become less and less practicable. At the same time the relations with the public have become more intimate and more difficult to maintain in a satisfactory condition. The result is that the situation in some cases is beyond the control of those in active charge because they continue to perform duties that should have long since been delegated to others.

The work of the modern manager is twofold: First, organizing the working force, with competent direction, so that the several departments will function effectively, severally and as a whole; second, personifying the utility to the public by word and deed in a way to win such confidence as is deserved. With the first of these duties accomplished the manager will have time for the second and can present the case of the railway as a business man to business men, through chambers of commerce and other business associations, clubs, etc., and by means of congenial personal relations with leading business men and public officials. The railway manager ought to be a welcome speaker at dinners and other gatherings of representative men, and the experience of many has shown that this can be so if he will first take the trouble to establish a point of contact with the public and will then give a presentation of the transportation situation that shows a broad grasp of the essential economic factors and a fine public spirit.

It Is a Good Time to Start Safety Work

THE PRESENT is an appropriate time to revive the safety campaigns which were such a feature of electric railway operations in 1913 and 1914. During the past four years there have been many reasons why popular interest could not be greatly attracted to the needs of safety. In the first place, there were many other demands on the popular attention because of the war. Liberty Loan drives and Red Cross and other campaigns for the benefit of our men in the service as well as international matters of various kinds made a stronger bid on the public mind. Then, the term "safety first" seemed somewhat incongruous in time of war, in spite of the fact that the best interests of our military forces abroad required the reduction to a minimum of casualties from industrial accidents at home.

The railway companies have also been handicapped during the last four years in carrying on an effective safety campaign because of the shortage of labor. This has tended to increase accidents, both because inexperienced trainmen had to be used and also because it was not always possible to give to equipment its proper inspection and maintenance. Yet it is a notable fact that in spite of these adverse conditions the accidents from surface cars in New York City have shown a constantly decreasing trend, and if the Malbone Street accident of the Brooklyn Rapid Transit on Nov. 1 of last year is disregarded, the same statement is true of the rapid transit lines in Brooklyn. This lessening of the casualty record in New York City is due largely, in the opinion of the Public Service Commission, to a greater use of safety devices and methods.

Now that the war is over the public should be receptive in a notable degree to the revival of safety precautions. It is the duty of all, after our tremendous but necessary sacrifice of life, limb and money in the war, to conserve to the uttermost these foundations of national wealth and prosperity. Safety is a duty which we owe to those returning from the battlefields of France, because where this country has to support the dependents of those injured through accidents at home it is unable, by just so much, to give to the families of those crippled or killed in its defense.

The time is appropriate for pushing safety campaigns also because inventors are paying more attention than ever to safety devices. The safety car itself is a notable example, but the trend toward safety has been equally marked in other types of cars and in other branches of the work. Finally, it ought to be more easy than formerly to interest the employees in the safety movement. They are receiving far higher wages than ever before and they can make it easier for the companies to pay these wages if they keep down the accident expenses.

The Safety Car Is Primarily a Frequent-Service Car

IT SEEMS STRANGE that when the electric railway industry desires to introduce so promising an improvement as safety car service, there should be so much opposition to this improvement in many quarters. The employees seem to feel that because one man per car is required rather than two the total number of men employed will be reduced. Another objection, we might almost say the other objection, to the operation of a car by one man is based on the fear that accident hazards will be increased. As a consequence of these two misconceptions a lot of ill-advised agitation is going on which, in so far as it is effective, will hamper the electric railways in giving the improved service which must be given if electric railway operation is to be profitable.

In the meantime, however, the safety car is making steady progress, and the year 1919 will show many service betterments due to its introduction. Attention was directed in this paper last week to the inauguration of safety car service on one line in Bridgeport, Conn., and in the current issue further information is given of the preparation for and introduction of the new service. The Bridgeport case is typical and, like others which are available for unbiased study, furnishes facts which controvert the objections mentioned.

The primary purpose of the safety car is not to reduce the working force of the electric railway but to permit it to be used to better purpose. The lesson of the jitney has been that the public wants frequency and speed in urban transportation. The safety car is the railway's answer to the public's question: "What can you do to save our time in getting around town?" This answer means that the company must have plenty of cars and must move them as rapidly as traffic conditions will permit.

It is ridiculous to insist that two men be kept on a car if only one is needed, particularly if the employer is willing to provide another car for the displaced operator, with higher wages for both. It is as useless to protest against the use of a labor-saving car as it is to object to the introduction of a machine which can perform some manufacturing operation with less labor. If the machine or the car is a success in accomplishing its purpose the worker as well as the public benefits. As far as safety is concerned, the small car will prove an accident reducer rather than an accident producer. It is under such perfect control, its momentum is so small and the safeguards which surround its operation are so many that fear on the public part for the safety of foot passengers and riders is not justified.

While the above is true, electric railways which operate safety cars or contemplete such operation should plan to utilize to the full the inherent virtues of these cars. In the first place the cars must be used in liberal numbers, thus furnishing as they glide by a constant reminder to the public of the service provided. Again, all slack must be kept out of the schedules so that the schedule speed may be maintained at the maximum value. Third, co-operation with the municipalities must be secured to give the cars as far as possible the right-of-way, avoiding traffic blocks. Above all, the little cars must be taken seriously by the management in spite of their insignificant appearance.

Good Maintenance Is Economy of the Wisest Sort

WE BELIEVE that electric railways are warranted this year in expanding their purchases on purely economical grounds. Before the war sent the prices of labor and materials skyrocketing, this was the season of the year when electric railway engineers and transportation men were busy preparing budgets for the approaching summer. During the past two years there has been a patriotic reason as well as an economic one to induce the railways to keep their budgets down to the minimum. Every ounce of material and hour of workmen's time available in this country were needed by the government in the work of national defense, so that all except the most essential work had to be abandoned. This condition has now changed. The bar against the employment of labor is removed; in fact, it is a patriotic act now to place orders and thus help to solve the non-employment problem. Hence the question of what policy should be adopted toward purchases is one which must be faced.

It may be said that railways have not enough money to begin an extended plan for improvements, and if they had they might better wait until prices are further reduced. As regards the first point, we are not advocating extensions at this time. Until the fare question is settled much new construction is out of the question. But every company should plan this year to put its operating equipment in as good working condition as it can and thereby save money on the principle that "a stitch in time saves nine." Translated into the language of the railway this means that insufficient paint on cars invites their rapid deterioration, neglect in track maintenance means rapidly mounting repair bills for a car equipment, and a few dollars spent in safety equipment will often protect against an accident costing many thousand dollars. Again, better facilities in the way of more comfortable service will often reconcile the public to an extra cent or 2 cents in fare. The physical condition of railway equipment is worse now than it has been for a long time because much of this work had to be omitted last year and the year before. But it is obvious that while cars continue to operate they must be maintained.

Finally, there is the question of prices. Are not they coming down? Perhaps so and perhaps not, or, if so, probably not so very much. Copper and some of the other metals have already decreased in price, and probably will go even lower within the next month or two. In fact, some metals, like copper and lead, are now close to the prices charged just prior to the war. Indications are, however, that producers are feeling out the market and that the low prices of this spring will be succeeded by considerably higher quotations as industrial expansion opens up. But no matter what the price situation may be, the real question is whether the deterioration which will result in equipment from lack of attention during this time, and the traffic which will be driven away because some inexpensive improvement is lacking, will not more than outweigh the saving to be effected by a slight drop in cost of the material required.

We believe that in most cases it will, and in any event the gain made by the change is definite and absolute while the saving from the drop in cost is entirely problematical.

Tie Renewal Cost Reduction Deserves Serious Study

BY R. C. CRAM
Assistant Engineer, Department of Way and Structures,
Brooklyn Rapid Transit System

TIES MAINTAINED LIKE THIS HAVE A LONG LIFE

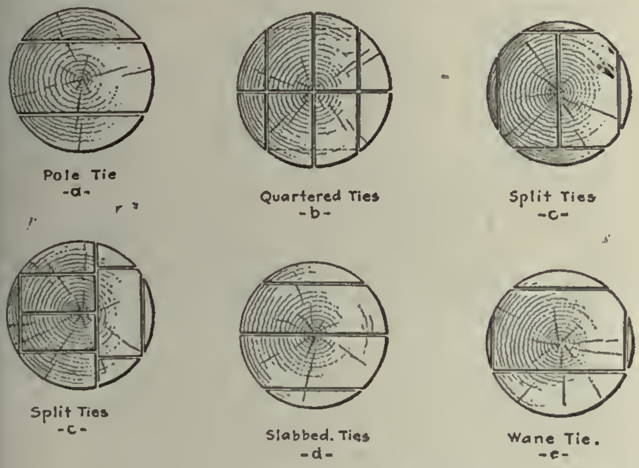
The Place to Begin Is in Specification and Maintenance — Other Factors Are Use of Suitable Preservatives, Provision of Good Drainage, Liberal Spacing, Prompt Removal of Defective Ties and Insuring Full Life From Ties in Use

TIE RENEWALS represent the largest single item of cost in open track maintenance, if the general item of maintenance labor is excepted. When this fact is considered it becomes evident that every possible step should be taken which will tend toward economies in tie consumption. The force of this statement will be appreciated by those whose duty it is to purchase tie timber at the present time. In 1915 the total number of wooden ties purchased in the United States was 97,106,651. The electric railways bought nearly 9 per cent of these, or 8,607,996 ties. This was a decrease of nearly 300,000 from the number purchased in 1911. The 6-in. x 8-in. x 8-ft. tie contains about 32 ft., board measure, hence the electric roads used about 275,545,600 ft., board measure, which, at the prevailing price in 1915 of about $15 per thousand feet, represented an estimated expenditure of $4,131,840. Recently, tie timber has been quoted as high as $55 per 1000 ft., board measure, which represents an increase of more than 300 per cent in about three years. If this price prevails and consumption is anywhere near what it was in 1915 we may assume that electric railways will have to spend over $12,000,000 for wooden ties this year, unless maintenance is greatly restricted.

Aside from war conditions the exhaustion of local supplies had begun to force the cost of ties upward, and a peculiar form of blight had practically forced the abandonment of chestnut as tie timber in the northeastern part of the country where this timber has been fairly abundant and largely used. In order to overcome the increasing shortage of tie timbers, a few of the steam roads started tie plantations some years ago, but it is understood that so far the results obtained have not been entirely satisfactory, although the experiment has not been continued long enough to warrant very definite conclusions. In any event, the electric railways cannot afford to entertain the tie plantation proposition.

It will be seen that the existing supply of tie timber should be conserved and protected by all possible means and it is very certain that, while numerous substitutes for wooden ties have been tried, we shall continue to use a vast number of such ties for many years to come. Through the use of mechanical means to protect ties from wear, with preventatives and other means for protection against decay, the life of ties may be increased to a degree which warrants considerable extra expense in that direction.

It is not economical to use an inferior tie simply because it is comparatively cheap. Inferior ties when used should be protected in ways which will add to their life. It costs just as much to handle and install a cheap and inferior tie as it does a first-class tie, while inferior ties will cause more frequent disturbance to track, as they require more attention to spiking conditions and more frequent renewals.



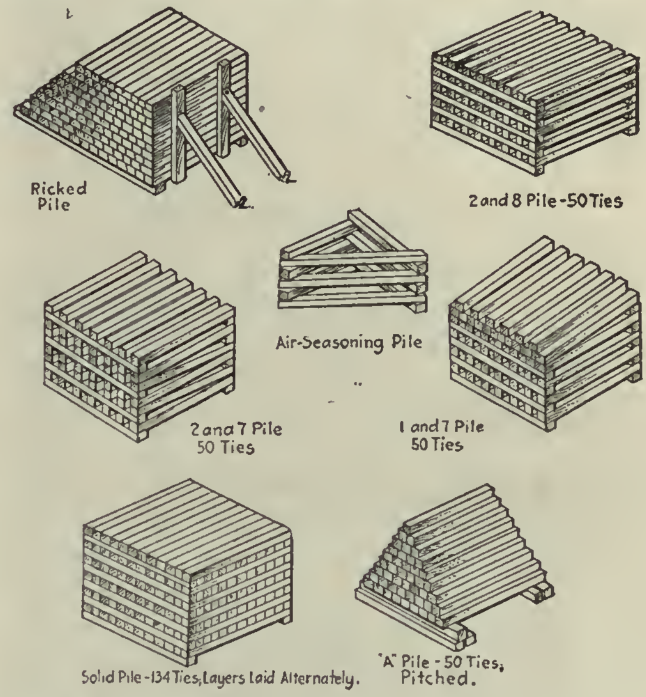


FIG. 1—TYPES OF TIES (WILLARD). FIG. 2—METHODS USED IN PILING TIES (WILLARD); UPPER TWO ROWS, UNTREATED TIES; LOWEST ROW, TREATED TIES

WHAT ARE "HEART" TIES, "SLAB" TIES AND "CULLS"?

The manner in which the tie is cut out of the tree is generally the basis for defining its kind. A tie cut from a tree from which not more than one tie can be produced from a section is called a "pole" tie and it is hewed or sawed on two parallel faces. When made from a tree of a size that two or more ties can be made from a section by splitting, the tie is called a "split" tie. An inferior tie, named a "slab" tie, is sometimes made from the first or outside cut of a log. A sawed tie has the two sides and two faces sawed. The upper or lower plane surface is called the "face." A "quartered" tie is one made from a tree of a size to yield four ties per section. A "slabbed" tie is one sawed on only two faces. If the two faces are of equal width, a slabbed tie is also a "pole" tie but should the lower face be wider than the upper, it is called a "half-round" tie. A "hewed" tie must be hewed on at least two surfaces other than the ends.

Tie specifications always limit the amount of sapwood, and if the section shows more than the specified amount the tie is called a "sap" tie. If the specified amount of sapwood is exceeded on only one or two corners, but does not measure more than 1 in. on either corner measured diagonally across the tie, it is classed as a "heart" tie. An "all-heart" or "strict-heart" tie has no sapwood. A "wane" tie is made from a tree too small to make a pole tie, by allowing the original surface of the tree to show on one or more corners. When a tie has been made from a tree from which the resin or turpentine has been extracted before felling, it is called a "tapped" tie.

Ties which do not conform to the specifications are "cull" ties. Those used under rail joints are called "joint" ties, and they are generally selected for this particular use because of size and other features which make them particularly suitable for the heavy duty at joints. "Intermediate" ties are those between joint ties. The tie or group of ties which is used to support switch operating mechanisms, is called a "head-block" and is usually of greater length than an ordinary tie. "Switch" ties are those used to support turnouts and are usually of special lengths and sizes for this purpose. A "treated" tie is one which has been subjected to some process intended to prevent decay. "Shakes" are separations of the wood fibers due to action of wind upon the standing tree. "Checks" are cracks in the wood usually caused by seasoning.

White-oak timber is by far the best for use as ties and is the most largely used. (See Table I.) It is but seldom treated and it has been stated that it is scarcely economical to do so, owing to its very high resistance to decay. The average life of white oak under heavy steam-road traffic is about nine years, while this is extended to from twelve to fifteen years for moderate traffic. Bur oak, rock oak, and chestnut oak will last from six to eight years. Other species of oak, such as black and red oak, pin or swamp oak and water oak are inferior woods and have a life of from four to five years if untreated. The several species of pine are used on steam roads in quantities second only to oak, but chestnut has taken second place on electric lines and the pines take third place. While it is a soft wood as

TABLE I*—PROPORTIONS OF DIFFERENT SPECIES OF WOODS PURCHASED FOR TIES BY ELECTRIC RAILWAYS IN 1915

Kind of Wood	Per Cent of Total Purchased
White oak †	26.7
Chestnut	21.8
Cedar	11.6
Southern pine ‡	10.3
Red oak †	10.3
Douglas fir	7.4
Redwood	3.3
Western yellow pine ‡	2.5
Cypress	1.2
Eastern tamarack	1.0
All others	3.9
Total	100.0

* Rearranged from a similar table in *Electric Railway Journal* for May 19, 1917, page 942.
† Total oaks combined equivalent to 37 per cent of total purchases.
‡ Total pines combined equivalent to 12.8 per cent of total purchases.

compared with oak, pine is quite slow in decaying and long-leaf heart pine life will average seven years and has been known to last twelve years. Some pines, if high in pitch, will check badly, but long-leaf yellow pine is much to be preferred for bridge timbers and bridge ties, since it does not warp as much as oak.

Chestnut is not used much for bridge timber because of its tendencies to split and check, but for ties it is nearly as durable as oak, having a life untreated averaging seven years. Cedar is a durable species of soft wood and will resist decay for from twelve to fifteen years, but it is apt to fail from spike driving and nail cutting. Cedar takes fourth place as to use by electric roads, and has an average life of ten years. Hemlock is a soft wood and is very short-lived when untreated, averaging not over four years. Its use continues to a considerable degree because of its cheapness. Tamarack and spruce have characteristics quite similar to hemlock and cost about the same but have an average life of from five to six years. Red and black cypress are soft woods, largely used in the South, and they decay rather slowly. Cypress has an average life of nine years. In California, redwood is used to a large extent. It is classed as a soft wood which resists decay quite well, lasting five years untreated and without tie plates and twelve years when used with tie plates and treated.

The foregoing information on life of ties is based on steam road conditions and experience and it may be stated that very few woods other than those mentioned are of much value as ties unless treated. The Chicago, Burlington & Quincy Railroad has found from its experience in eight different states that practically all untreated ties which it uses reach the end of their life in seven years for all species except white oak, chestnut and cypress. The percentage of these species removed after seven years of service were 10 per cent, 37 per cent and 51 per cent respectively.

Authoritative information as to the life of the several species of ties used by electric railways is very meager, but it is safe to estimate that for open track conditions the steam road data will apply, with some modification where traffic conditions are less severe. The following from a report on untreated ties for electric railways, presented before the American Wood Preservers' Association and published in the ELECTRIC RAILWAY JOURNAL for Jan. 22, 1916, has some bearing:

1. *Untreated Ties in Interurban Lines.* The following estimates were secured from officials of six companies operating in the Middle West:

Cedar	Untreated	No tie plates	7– 8 years 9–10 years	Michigan Michigan
Cedar	Untreated	With tie plates	12–15 years 15–16 years	Michigan Michigan
Cedar	Untreated	No tie plates	11–12 years	Illinois
White oak	Untreated	No tie plates	7– 8 years 10–12 years	Michigan Michigan
White Oak	Untreated	No tie plates	6– 7 years	Indiana

2. *Untreated Ties in Unpaved and Macadam Streets.* Officials of several companies operating in the Middle West supplied the following estimates:

Cedar	Untreated	11–12 years	Illinois
White oak	Untreated	8–10 years	Illinois

Oak and beech. Reported as badly decayed and removed after two years from track laid on gravel ballast in Illinois.

3. *Untreated Ties in Paved Streets.* A third and important condition under which ties are used is in tracks in paved streets. The situation is complicated not only by lack of authentic data, but by the variety of types of construction in use. Some light is thrown on the service secured from untreated ties in these types of track by the following tabulation of opinions expressed by officials of a number of companies operating in the Middle West:

Locality	Species	Life Untreated Years	Remarks
Michigan	White oak	12–15	Life of tie equal to life of rail
Michigan	White oak	20	Life of tie equal to life of rail
Michigan	White oak	10	
Illinois	White oak	20–25	Equal to life of rail, provided tie is not disturbed
Indiana	White oak Hemlock	20	Life of tie equal to life of rail
Illinois	Tamarack Cedar	15–20	Life of rail

Further, in regard to life of ties in tracks in paved streets, cedar ties have been reported as having a life of eighteen years or more in such streets in Milwaukee, and long-leaf heart-pine ties have been reported as having an average life of eighteen and six-tenths years in paved streets in Brooklyn. In the latter case the in-

Specification for Cross-Ties*

Quality—All ties to be cut within ten months prior to the time of delivery; from sound, straight, live and thrifty timber, free from loose or rotten knots, dry rot, wind shakes or any other imperfections affecting the strength or durability of the timber.

Dimensions—6 in. thick, 8 in. width of face, and 8 ft. long. The allowable variation from the above dimensions may be obtained from the following table:

	Hewed	Pole	Sawed
Ties known as No. 1.			
Depth not less than....	6 in.	6 in.	6 in.
Face not less than......	7½ in.	6 in.	8 in.
Length	8 ft. to 8 ft. 2 in.	8 ft. to 8 ft. 2 in.	8 ft.
Ties known as No. 2.			
Depth not less than....	5½ in.	5½ in.	5½ in.
Face not less than......	6 in.	5½ in.	7½ in.
Length	7 ft. 10 in.	7 ft. 10 in.	8 ft.

Ties that do not conform in size to No. 1 or No. 2, or have any other defects, will be classed as cull ties and will not be accepted.

White and Bur Oak and Chestnut—Hewed ties must be stripped of bark, hewn smooth and clean of all splinters, deep scar marks, and must be straight, with faces true and parallel, and of uniform thickness with ends sawed off square. Ties hewn from one-half or one-quarter logs, or sawed from large timber, will not be accepted.

Yellow-Pine Heart Tie—Ties must be of good long-leaf Southern yellow pine and must be hewn smooth on all sides with faces parallel, and of uniform thickness with ends sawed off square. Ties must be free from rot, worm holes, wind shakes, loose or unsound knots, red heart and other defects that will impair their strength and durability.

Ties should be hewn so that the heart will be at or near the center of the tie and must not have over 1 in. of sap on each corner, which means the tie must show 6 in clear heart on the 8-in. face and 4 in. of clear heart on the 6-in. face.

No short-leaf yellow pine ties will be accepted.

Sound and Square-Edge Yellow Pine—Ties must be of good long-leaf Southern yellow pine, or, in other words, must have the same qualities and must pass the same inspection as the heart pine ties regardless of the sap.

Cypress—Hewn cypress must be free from wave, rot, dote, honey-comb and other defects, to show one heart face; allowance, 1 in. sap on two opposite corners.

Ties must be hewn smooth on all sides with faces parallel and of uniform thickness and saw butted at both ends.

Inspection—All ties shall be subject to the inspection of an agent of the maintenance of way department at the point of shipment.

The expenses of the inspection shall be equally apportioned between dealer and railway companies.

Freight must be prepaid on all shipments.

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*From 1918 report of committee on way matters, American Electric Railway Engineering Association.

formation was given in 1914 and the ties then reported on were replaced in service so they now average more than twenty-two years.

It is apparent that the life of tie timber will vary greatly under the conditions of service. Even the same kind of timber, cut from the same forest, will act differently on different parts of the same road. Ballast conditions and average moisture content as controlled by rainfall will create widely varying results. The following are some of the factors which affect tie life: (1) Kind of soil, ballast or foundation upon which the tie is placed; (2) size of tie and species of wood; (3) whether the tie is treated or untreated; (4) whether tie plates are used or not; (5) kind of spikes used; (6) care taken of ties while in service; and (7) mechanical wear due to traffic. Consequently it is almost impossible to make even a general statement as to the kind of timber which makes the best ties for universal service. Local conditions largely control and it might be better to use a cypress tie in one part of the country rather than an oak or yellow pine tie. Meanwhile, the utmost attention should be paid to the continued maintenance of proper shape of the ballast section between the ties, as a longer tie life will result if the ballast is arranged so as to provide ample drainage. This should be assisted by adequate ditching and cross-drains.

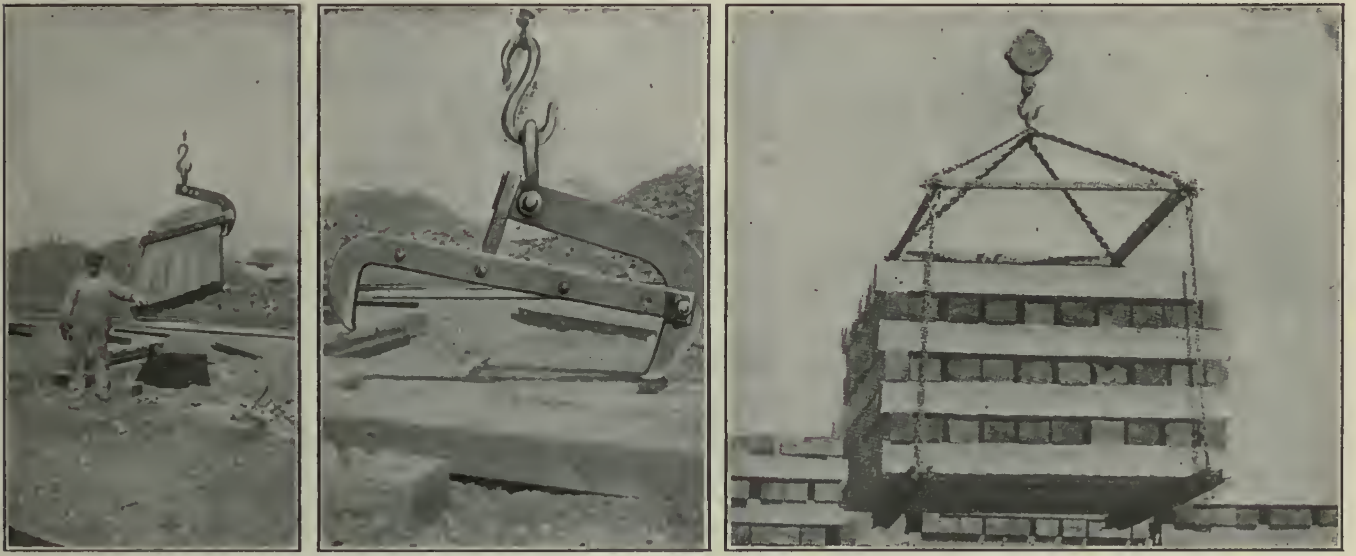


FIG. 3—DEVICES WHICH ARE EFFECTIVE IN DECREASING COSTS IN TIE HANDLING

CLASSIFICATION OF WOODS FOR USE AS TIES

Notwithstanding the long period during which wooden cross-ties have been used there is no standard rating of woods which are suitable for this service. It is apparent that different species will vary in natural durability and in capacity for preservative treatment, but aside from these qualities there are three important characteristics which the wood should possess: (1) It should be sufficiently strong to withstand ordinary strains due to center binding, etc.; (2) it should be sufficiently dense to resist spike pulling and lateral pressure on the spikes, and (3) it should be sufficiently hard to furnish a proper resistance to rail wear.

TABLE II—C., B. & Q. R.R. CLASSIFICATION OF TIE TIMBER ON BASIS OF HARDWOOD AND SOFT WOOD AND FOR USE TREATED AND UNTREATED

HARDWOODS

UNTREATED: 1 white oak, 2 bur oak, 3 chestnut, 4 locust, 5 black walnut, 6 mulberry, 7 sassafras.

TREATED: 1 red oak, 2 black oak, 3 pin oak, 4 water oak, 5 turkey oak, 6 Spanish oak, 7 black-jack, 8 beech, 9 hickory, 10 ash, 11 elm, 12 hard maple, 13 cherry.

SOFTWOODS

UNTREATED: 1 cedar, 2 cypress.

TREATED: 1 short leaf pine, 2 loblolly pine, 3 lodge-pole pine, 4 Douglas fir, 5 tamarack, 6 hemlock, 7 tupelo, 8 birch, 9 sycamore, 10 soft maple, 11 hackberry, 12 butternut.

It is desirable that a classification of the different species of woods as ties be established on a basis of their relative mechanical properties, and the United States Forest Products Laboratory has suggested such a classification based upon a composite figure involving the following mechanical properties: Static bending, impact bending, compression parallel to grain, compression perpendicular to grain, and hardness. Such a tentative classification is given in Table III. Meanwhile the C. B. & Q. R.R. has adopted a classification based on its experience with treated timbers and some tests which it conducted for determination of the spike holding power of different woods. (See Table IV.) This railroad now broadly divides woods into two classes: hardwood and softwood. Each class is subdivided into those for use without a preservative and those to be used only when treated. This classification is given in Table II and is fairly representative of the use of woods, treated and untreated, on the important steam roads. Generally the electric roads follow

TABLE III—TIMBERS ARRANGED IN ORDER OF THEIR MECHANICAL VALUE AS TIES

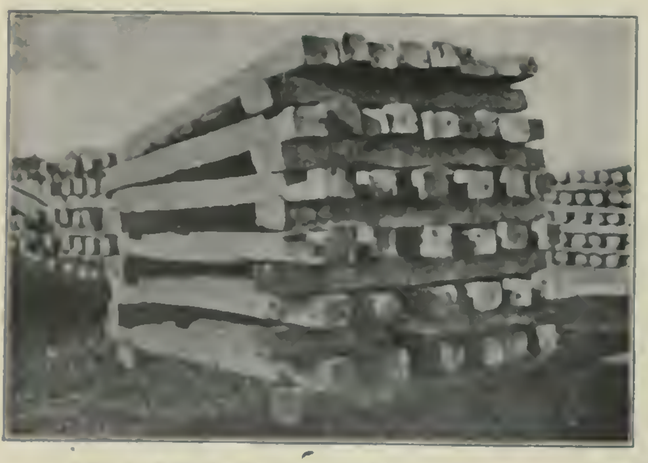
Species	Average Composite Value
Black locust	1,666
Sugar maple	1,140
White oak	1,050
Red oak	972
Beech	955
Long-leaf pine	914
Red gum	825
Short-leaf pine	800
Western larch	790
Tamarack	740
Eastern hemlock	700
White fir	610
Lodgepole pine	590
Western yellow pine	560
Northern white cedar	420

NOTE.—Figures are for average forest-grown material, and individual prices may vary 30 per cent above or below the average.

the same practice in this respect for their open tracks. Redwood, untreated, is used extensively in the West, and long-leaf heart yellow pine is often used untreated although better service is obtained when treated, at least for open tracks in ballast.

SIZES AND SPACING OF TIES

The proper sizes and spacings of ties are functions of condition of track and traffic. An easier-riding track will result from the use of smaller ties spaced close together than from larger ties spaced farther apart. Hence, spacing should be considered as of more importance than size. Two advantages are obtained by decreasing the spacing: (1) The unit pressure on all track material is decreased, and (2) the carrying capacity of the roadbed is increased correspondingly. There are so many controlling elements that it has so far been impracticable to follow any fixed rule for spacing ties, but the minimum spacing should not be less than the width of track shovels used. The usual spacing varies from sixteen to eighteen for a 30-ft. rail or eighteen to twenty for a 33-ft. rail, indicating a variation of from 2640 to 3200 per mile.



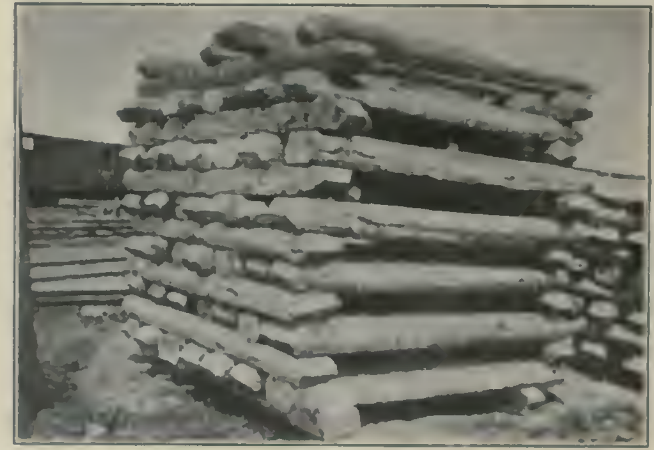


FIG. 4—SQUARED TIES PILED TO SHED WATER DURING SEASONING. FIG. 5—POLE TIES PROPERLY PILED FOR SEASONING

The thickness of ties used varies from 6 to 8 in.; the width from 6 to 12 in. and the length from 8 to 10 ft., the greater length being for bridge ties and tracks over marsh land. Electric railways use a size of 6 in. x 8 in. x 8 ft. almost universally while 7 in. x 9 in. or 7 in. x 8 in. x 8 ft. to 8 ft. 6 in. long are sizes being used more and more by steam roads. Bridge ties are usually 8 in. x 8 in. x 10 ft. spaced from 12 in. to 16 in. centers.

TIE RENEWALS SHOULD BE CAREFULLY CONTROLLED

Aside from the recent sharp rise in cost of tie timber due to war conditions there have been other causes at work which have increased the cost of tie renewals in recent years. Some of these causes are: (1) The constantly increasing price of ties, due to the steady rise in price of timber as the supply decreases, and the increased length of haul due to greater remoteness of sources of supply; (2) the use of the best grades of lumber for other purposes, leaving the inferior qualities for use as ties; (3) carelessness in drawing specifications and making inspections, causing acceptance of inferior material; and (4) increased mechanical wear due to inferior timber and heavier traffic which result in excessive rail-cutting and spike-killing.

Careful attention to item No. 3 will repay the trouble several times over. Both the purchasing agent and the engineer should realize that a tie is something more than "just a tie," and the fact that all ties of a species look more or less alike is no warrant that they are all equally serviceable. The quality of the wood is of much more importance than exact sizing, and an undersized all-heart tie is usually more durable than an oversized sap tie. For many reasons it is just as necessary to buy ties in accordance with strict specifications and to inspect them rigidly thereunder as it is to buy rails under a specification. The inspections should preferably be made at the points of shipment, as the dealer will avoid freight charges on "rejects" and the tendency to accept inferior material by the purchaser, because much-needed ties are on the ground, will be absent. This applies more to ties obtained from distant sources, since dealers who deliver along the railway lines generally know the specification and what will pass inspection. A specification for untreated oak, chestnut, yellow pine and cypress ties is presented on page 310.

It is obvious that the inspections should be made by men thoroughly versed in lumber, and in the tricks of the trade, and if the railway has no such person available it can well afford to hire the services of an expert in this line. The purchase and inspection period is the

TABLE IV—SPIKE-HOLDING POWER OF VARIOUS WOODS *

Kind of Wood	Maximum Resistance to Pulling, in Pounds Untreated	Treated	Resistance in Per Cent of That of White Oak Untreated	Treated
White oak	7,870	...	100	...
Water oak	....	6,780	...	86
Black oak	.....	7,230	..	92
Red oak	6,460	7,730	82	98
Bur oak	..	9,210	...	117
Ash	..	7,730	.	98
Chestnut	5,190	5,200	66	66
Elm	7,290	7,500	93	96
Beech	8,180	8,900	104	113
Poplar	4,920	5,670	62	72
Loblolly pine	3,630	4,210	46	53
Sweet gum	5,040	5,300	64	67
Hemlock	5,633	4,200	72	53
Soft maple	6,513	5,887	83	75
Hard maple	10,177	8,960	129	114
Hickory	10,153	10,433	129	133
Cypress	3,163	2,840	40	36
Birch	6,337	5,907	80	75
Cottonwood	2,810	2,743	36	35
Northern hard maple	10,393	.	132	...
White cedar	1,467		19	..

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* From *Railway Age Gazette*, June 16, 1911.

first place to exercise the true principles of economy.

The actual cost of tie renewals is divided into three principal elements, as follows: (1) cost of new ties delivered along the track; (2) cost of removing and disposing of old ties, and (3) cost of placing new ties in track. Items Nos. 2 and 3 are labor costs and have a most important relation to total expense. Together these two items will run from 20 to 60 per cent of the first item, depending on the kinds of tie and ballast used. The lower the first cost of the tie, the higher is the ratio of the labor cost to the first cost of the tie. Hence it is easy to see that the actual labor cost of tie renewals will be greater with inferior ties than with ties of first grade because renewals will be more frequent on account of the shorter life. By the use of tie plates and treated ties, the life of inferior ties can be greatly increased and labor costs reduced in consequence.

With untreated ties and no tie plates the yearly renewals on steam roads average from 250 to 350 per mile of track. Some trackmen consider that normal tie renewals should average two ties per 30 ft. rail yearly under moderate traffic. This would require about 700 ties per mile or about 30 per cent annually. There is no doubt but that the practice of making single renewals ("spotting in") is more advantageous in the long run than the practice of renewal "out of face" or in continuous stretches. The trackmen should be instructed in proper methods of piling ties for seasoning and as to the proper time for making renewals; the proper places to use hardwoods, softwoods and treated ties and where to use culls and second-hand ties. The yardmen in storage yards should also be advised as to methods of piling ties. Some of these are shown in an illustration on page 309. For instance, untreated ties should be piled in a way which will allow free circulation of air about each tie, after the manner shown in Fig. 2. The ricked pile so often used for large quantities of untreated ties should be avoided as it prevents or retards air seasoning and is apt to assist in growth of fungi because of the greater percentage of moisture retained by timbers in contact.

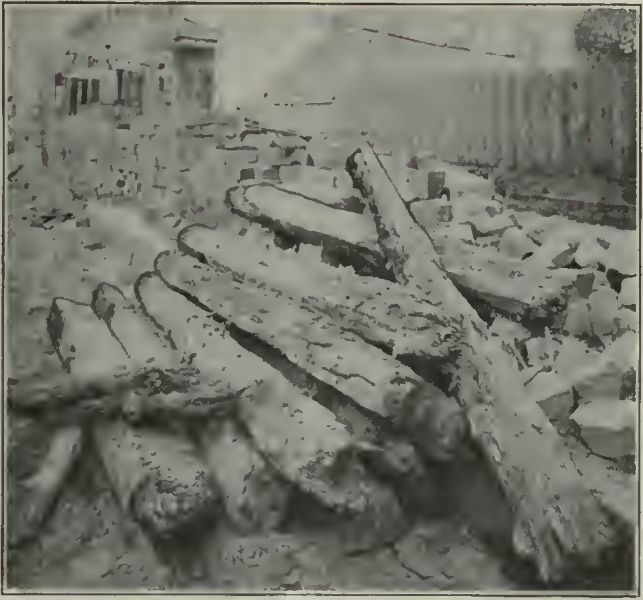


FIG. 6—TREATMENT WOULD HAVE MADE THESE CEDAR TIES LAST LONGER

The tendency of certain woods to check in the seasoning process may be largely overcome by the use of "S" irons driven into the ends. Season checks are serious defects, in that they permit moisture to reach the interior of the tie, thus assisting in promoting decay and causing a liability to split when spikes are driven. The type of ties known as "split" ties check badly because the heart is exposed on one face. For this reason trackmen should be instructed always to place the heart face downward in the track.

Ties should not have any bark on them when placed, as the bark holds water and loose bark offers little frictional resistance to ballast, thus rendering the tie liable to shift readily. Hewn ties are generally considered better for use untreated because the hewing process closes the pores of the wood and tends to prevent absorption of moisture. Untreated sawed ties decay more rapidly because the saw cut cannot be kept parallel to the grain and a larger end area of fiber is exposed than in hewed ties. Decayed ties should be disposed of as soon as possible to prevent spreading of fungi to sound ties.

Ties should not be removed from the track until it is certain that not another year of safe life remains. Nevertheless it is poor economy to leave badly decayed ties in service because they make the adjacent good ties do more than their share of work and cause more rapid failure. The decision as to just what ties present conditions requiring renewal requires experience and judgment. More waste can be caused at this point than at any other. The objects of proper tie inspection for renewals are to secure uniform practice, to prevent unwarranted removals before safe service is past and properly to distribute renewals. Tie inspection for renewals is too often left to the sole judgment of the section foreman. He likes to use up all the ties on hand regardless even if some of the ties removed would have lasted a year or more longer. The best way to inspect for renewals is to have the work done by one man who is thoroughly versed in the work. His work should be checked by the roadmaster, and the engineer should give close attention to this work also. A fair check can be had by comparing average renewals over a series of years, combined with personal inspection of sections here and there. In no case should ties be removed without orders and they should be piled near by for inspection by proper authority before disposal. It may be well to quote here the observations of W. F. Carr, engineer of maintenance of way, Chicago, Ottawa & Peoria Railway, on tie renewals. He said in an article in the JOURNAL for March 31, 1917:

> Ties, according to our experience, cannot be too carefully inspected. Untreated red oak, black oak, beech, elm or gum ties had better be left out of the track than put in. They will decay inside of three or four years, and, in the case of elm or gum, will check so badly in a short while that they are unfit for use. An undersized tie should not be bought. It is not capable of performing its proper duties as a bearing surface. Pole ties or ties cut from young white oak should have a width of face not less than 6 in.; otherwise the sapwood portion of the tie will rot off in a couple of years and the result is a fence post about 4 in. in diameter.

Another point that should be watched very carefully is that treated ties are cut from live, sound wood. I have seen well-treated ties which were so brashy that, when they were thrown from the car to the ground in unloading, they broke like sticks of punk. Just as good ties are needed for sidings as for main track, because a siding usually cannot and does not receive the same amount of attention that main tracks do, and when a siding is tied up it should be tied up with good, sound timber.

It is well to bear in mind that the life of a tie is always determined by the length of time that it will hold a spike. This life may be prolonged by pulling the spike when it begins to work up, driving in a tie plug and redriving the spike. It is worth while to do this in a great many cases, and in every case where a railroad is well maintained, as it will prolong the life of ties for a year or two. Economy in maintenance forbids the removal of a tie that will give service for six months, except at public or private road crossings. This rule can be adhered to in ordinary maintenance without any risk, because the average track foreman is too much inclined to make a clean sweep of tie renewals, and a check like this should be placed upon him.

When inspection tests are made for soundness, the ties should not be mutilated more than is necessary. Ties should not be tested on top except for decay around spikes and tie plates. To test a tie for strength, one end of a pick should be inserted under the end and used as a lever. A broken tie will usually show up under this method. Sap rot alone should not condemn a tie for service. Removal for rail cutting need not be done as a rule unless the cut extends more than 1 in. into the face. The most careful attention should be paid to red oak, pin oak and all other woods which decay from the heart as these are apt to leave a hard shell which tends to hide the true condition of the tie.

In connection with inspection for renewals, those interested will find an excellent set of rules governing this work, as done by the Buffalo, Rochester & Pittsburgh Railway, in Willard's "Maintenance of Way and Structures," page 78. These rules furnish a guide from which rules for use under electric railway administrative conditions may be readily adapted and used with beneficial results.

MAINTENANCE CAN BE GREATLY REDUCED BY USE OF TREATED TIES

The use of treated ties has been increasing quite rapidly on the steam roads, but the electric railways have not paid as much attention to this subject in the past. The last available statistics (1911) indicate that only 15 per cent of the ties purchased by electric railways were treated while the steam roads treated 24 per cent. That more attention is being given to treatment is evidenced by the recent installation of a treating plant by the Boston Elevated Railway. Only two or three other companies have their own treating plants. Generally it is not economical for them to make the investment, but this fact should not prevent a far greater use of preservatives, since there are many private plants which do this work. Where companies do not feel able to afford either a plant of their own or to purchase treated ties from commercial pressure treating plants, the open-tank method is available, and although the results from open-tank treatments are not considered equal to those from pressure treatments, they will provide a preservative treatment which will amply repay the investment. Where treated ties are purchased, a good specification covering the treatment may be found in the report of the way committee in Proceedings of the American Electric Railway Engineering Association for 1916. There is no longer any question as to whether tie treatment is an economical measure for greatly prolonging the average life of ties, thus reducing maintenance charges. The report of the way committee above mentioned indicates this clearly. Table V is taken from that report and gives information as to estimated life treated and untreated and annual cost reductions due to treatment.

TABLE V—ESTIMATED AVERAGE LIFE OF TIES

Kind of Timber	Estimated Life of Untreated Years	Estimated Life Treated With 10 Lb. Creosote per Cu.Ft. Years	Annual Charge Untreated	Annual Charge Treated
Longleaf pine	7	20	$0.159	$0.108
Chestnut	7	15	.145	.13
Spruce	6	14	.175	.13
Tamarack	5	15	.187	.123
Hemlock	5	15	.169	.115
Red oak	4	20	.240	.101
Beech	4	20	.214	.094
Maple	4	18	.240	.107
Gum	3	15	.338	.134
Elm	5	20	.196	.101
Loblolly pine	2	15	.381	.109
Sycamore	4	15	.239	.127

This table was taken from H. F. Weiss' book on "The Preservation of Structural Timber," and it must be borne in mind that the durability of untreated timber of any species is influenced by a great variety of factors. Among the most important of these are the species and quality of wood used, climate, soil, drainage, ground cover, etc. Since different combinations of these factors will occur in different cases, the durability of a given species cannot be expected always to be the same. Any estimate on the durability of timber must, therefore, be judged with considerable latitude.

The results of seven years service tests by the Chicago, Burlington & Quincy Railroad also clearly show the comparative results in tie life between treated and untreated ties, with a comparison of results obtained with the three principal treatment processes in use. These results are summarized in Table VI. The several treatments mentioned in this table include the straight creosote process, whereby creosote oil is forced into the wood under pressure until the absorption is from 5 to 10 lb. of oil per cubic foot of timber. The Card process consists, briefly, in the use of a mixture containing about 80 per cent zinc-chloride solution and 20 per cent creosote, injected to an absorption of about ½ lb. dry zinc chloride and 2 or 3 lb. of creosote per cubic foot of timber. The Burnett process involves the use of zinc-chloride solution alone applied under pressure, after preliminary subjection to vacuum, until the wood refuses to absorb more, the absorption ranging from ⅓ to ½ lb. of dry zinc chloride per cubic foot of timber.

In connection with timber treatment it is absolutely essential that fuel specifications covering the kind of tie to be used be strictly enforced, and it is very important to have adequate inspection at the treating plant. When the purchaser has no one available for this service the commercial inspection bureaus will supply inspection at a very reasonable cost.

It should also be noted that the way committee states in the 1916 report that while zinc chloride is an effective wood preservative the experience of several companies indicates that it increases the conductivity of the timber and gives an impetus to the corrosion of spikes,

TABLE VI—INFLUENCE OF TREATMENT ON LIFE OF TIES AS SHOWN BY C., B. & Q. R.R. SERVICE TESTS

Treatment	Total Ties Placed 1909-10	Total Ties Removed Up to 1917	Per Cent Removed Up to January, 1917
Creosote	3,264	16	0.5
Card process	15,817	455	3.0
Burnett process	2,488	100	4.0
Untreated	3,270	2,626	80.0

tie plates and rail bases. The recent article in the JOURNAL by E. R. Shepard on leakage resistance of electric railway roadbeds also states that the use of zinc chloride and similar preservatives should be avoided where escape of stray currents is objectionable.

SOME OF THE PRINCIPAL COST-REDUCING FACTORS SUMMARIZED

The foregoing matter has been compiled from many sources, principally from the reports of appropriate committees of the American Railway Engineering Association and the Electric Railway Engineering Association; Willard's "Maintenance of Way and Structures," and the files of the ELECTRIC RAILWAY JOURNAL. It may be well to summarize as follows:

1. The first place to secure tie economy is in connection with purchases. These should be made only on proper specifications and adequate inspection.
2. The utmost care should be exercised when inspecting for tie renewals and regularly qualified tie inspectors are to be preferred to the section foremen.
3. Methods of placing, piling, handling and seasoning ties should be covered by proper instructions.
4. Great care should be exercised to see that ties are adequately drained in the ballast.
5. The use of preservatives presents the best field for reducing tie renewal charges, and the present cost of ties, even of inferior grades, almost forces the adoption of preservative treatment as the chief measure by which costs may be reduced. Care must be taken to see that tie plates are used with all treated ties and with all inferior untreated ties.

Maintenance of Edison-Type Storage Batteries

BY OTTO GOTTSCHALK
Master Mechanic Richmond Light & Railroad Company, New Brighton, N. Y.

WHEN Edison batteries were first used by the writer in connection with low-voltage control equipments serious conditions developed. Cells were found short-circuited due to the metal containers bulging so as to come in contact with adjacent cells. The trouble was found to be due to the depositing of the alkali in the solution around the vent caps. This deposit would build up in sufficient quantities and develop sufficient density to prevent the vent caps from opening, thus preventing the gas from escaping.

If it had been possible to give the batteries attention each day this condition would not have occurred, as the opening and closing of the vent caps would have broken the deposit. These batteries, however, were maintained on a mileage basis and in consequence from six to ten days elapsed before they received attention.

To overcome this trouble it was suggested to the company's representatives that they develop an oil for use in the vent caps which would not be destroyed by the electrolyte or prove injurious to the same. The Edison Company's chemists accordingly developed this oil, which was spread on the surface of the metal inside the vent caps so that the oily surface would not hold the globules of solution containing alkali which rise with the bursting gas bubbles. When this oil was used it was found unnecessary to clean the batteries oftener than four times per year.

In connection with the maintenance of this type of battery some further details may prove interesting. At each inspection distilled water was added to the cells to bring the solution up to the prescribed height. A check of the specific gravity of the solution was made once a month. I found that the length of time that the solution could be continued in service before complete renewal was necessary depended on the work which the batteries were required to do. It was found possible to use the same solution in some instances for three years. To determine when it should be renewed various readings of specific gravity were taken and when the gravity was found as low as 1130, it was found best to replace the solution.

As it is essential that all water used for filling batteries should be pure, where any uncertainty existed as to the purity of the distilled water employed I used the following simple tests with entire satisfaction: The material used in carrying out the tests comprised a 10 per cent solution of silver nitrate to which a few drops of nitric acid had been added, a 10 per cent solution of barium chloride and two test tubes about ½ in. in diameter by 5 in. long. The silver nitrate solution should be kept in opaque or amber glass bottles. The reagents can be obtained in any drug store.

In the test for sulphites the test tubes were rinsed out thoroughly several times with the water to be tested. Finally, one tube was two-thirds filled with water and three or four drops of the barium chloride solution were added. After thorough mixing this solution was compared with a sample of the same water in another tube to which no reagent had been added. A white cloud or precipitate indicated the presence of sulphites.

To apply the test for chlorides, the tubes were thoroughly rinsed out as already described. After two-thirds filling one tube with a sample of the water to be tested, three or four drops of the silver nitrate solution were added and the mixture was thoroughly stirred. This as before was compared with a sample of water to which no solution had been added. A white cloud or precipitate indicated the presence of chlorides.

Boston Transit Commission Issues Report

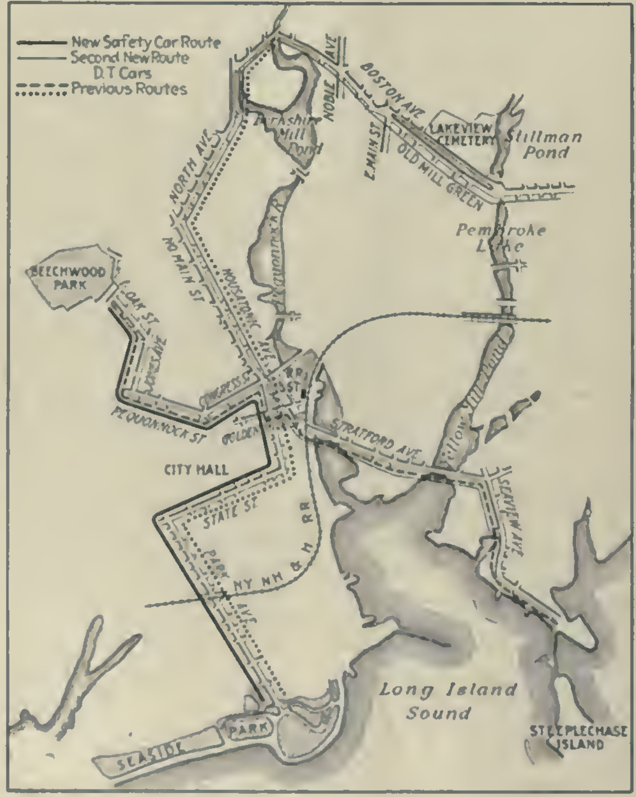
The Boston Transit Commission has issued its twenty-fourth annual report for the year ended June 30, 1918. In view of the expiration of the term of office of the commission and the taking over of its powers by the City of Boston, this report is also the final one for the commission. Since March 28, 1895, this commission built the following subways and connections: Tremont Street Subway, 1.68 miles; East Boston Tunnel, 1.42 miles; Washington Street Tunnel, 1.16 miles; Cambridge connection, 0.47 mile; Boylston Street subway, 1.50 miles; East Boston Tunnel extension, 0.41 mile, and Dorchester Tunnel, 2.26 miles. The approximate total cost involved was $34,954,000.

It is reported that the Vienna municipal authorities are much worried by a daily loss of $9,000 in electric car receipts due to the fact that the conductorettes are entirely unable to collect from those who crowd the buffers and footboards of the cars. The authorities hope that this crowded condition on the surface cars will be speedily relieved when the subways are reopened.

Bridgeport Well Pleased with Safety Cars

Pioneer Safety-Car Service in East Was Inaugurated on Feb. 2 on Nine-Car Line Through Business Section of City—Special Precautions Were Taken to Safeguard Initial Service to Insure Freedom from Interruption

BRIDGEPORT, CONN., is a center of very great manufacturing activity and is the seat of a number of industries which were especially important in the prosecution of the war. The local electric railways, which form part of the system of the Connecticut Company, were greatly overtaxed by the influx of munitions and other industrial workers. As the Connecticut Company was not in a position to finance track extensions and increase in rolling stock necessary to care for the augmented traffic, the United States Housing Corporation undertook to do this. The corporation, among other things, purchased twenty one-man safety cars for the Connecticut Company, and of these eleven were assigned to the Bridgeport division. These cars were put into service on Sunday, Feb. 2, and since then have been operating very satisfactorily. Nine of the cars are used in regular service and two are held in reserve for emergency operation. With the new cars at its disposal the problem before the management of the Connecticut Company was so to use them as to produce the greatest relief for the congestion at Bridgeport (and elsewhere on the system). No one existing line in the city seemed exactly adapted to the new cars so that parts of two lines were selected and combined to produce a new route, the one over which the cars are now operating. The accompanying map has been prepared to show just how the rerouting was done as an incident to the inauguration of safety-car operation. Previous to the rerouting one route (dotted line on map) was from the end of Park Avenue at Seaside Park via South Park Avenue, State Street, Main Street and North Avenue to Boston Avenue. A second line (shown by dashes on the map) traversed Seaview Avenue, Stratford Avenue, Housatonic Avenue, Golden Hill Street, Main Street, Congress Street, Pequonnock Street, Jones Avenue and Oak Street to North Avenue.



OUTLINE MAP SHOWING SAFETY-CAR LINE IN BRIDGEPORT TOGETHER WITH THE ROUTING CHANGES INCIDENT TO ESTABLISHING NEW SERVICE

In selecting the route for the safety cars the object was to avoid as far as possible such sources of possible delay as would prevent the cars from demonstrating their real capacity for service. The new line is shown on the map by a heavy solid line. It connects Oak Street with the Seaside Park end of South Park Avenue, traversing Main Street, which is the principal business street of the city for several blocks. The other new route is indicated by the light solid line on the map. For sake of completeness it should be stated also that coincident with the rerouting a track extension on Boston Avenue, constructed with funds furnished by the Housing Corporation, was put into commission. This track extension played an important part in the preparation for the new service, as will be explained later in this article. The new safety car line taps two residence sections of the city, connecting them with the business center, and in the past the traffic between these sections and the business center has not been sufficient to warrant very frequent service with the large standard double-truck cars of the company. On one part of it, indeed, only fifteen-minute headway was considered warranted with the large cars during a considerable part of the day. The consequence was that much possible traffic was lost through lack of frequent service and experience has already demonstrated that the small cars are picking up this traffic. On the Oak Street line, the one just referred to, fifteen-minute service was given for nine hours and ten-minute service for the balance of the day. This line has now five-minute service all day. On the other former line, the South Park Avenue line, there was a straight ten-minute headway. This line has now, of course, five-minute service also.

In preparation for inaugurating the new service, J. K. Punderford, general manager The Connecticut Company, laid out a threefold program. This included first, the selection and training of the car crews who were to operate the new cars together with instruction of the supervisory and shop forces; second, the acquainting of the public with the changes in the lines to minimize inconvenience to patrons and at the same time to explain the characteristics of the new cars so as to obtain the full advertising value of the improvements; and third, the testing and inspection of the cars, track and overhead so as to avoid the occurrence of preventable interruptions to service. These three parts of the program are discussed in the following paragraphs which also include comments upon the results secured. In carrying out this program Mr. Punderford has had the hearty co-operation of Joseph S. Goodwin, manager, and F. L. Kibling, superintendent of the Bridgeport division, who are in direct charge of operation and who have been untiring in their efforts to make the new service a success.

The first task was the selection and training of the car crews. It was decided to train twice as many men as would be needed for the operation of nine cars, a total of thirty-six, in order that there might always be available a supply of men competent for the purpose. A list of 100 men was selected by the management from those considered well suited for the new work, including both motormen and conductors. This was arranged in order of seniority and posted to give the men an opportunity to "bid in" the runs. The statement was made that the safety car operators would be paid 5 cents per hour more than the regular rates and if enough men were not secured from the first list a supplementary list would be posted. The new work proved popular and the runs were promptly bid in.

The men were broken in on the North Avenue extension on Boston Avenue, previously referred to. This track was put in to provide transportation for workers at the Remington Arms plant and it was possible to defer putting it into commission until after the safety car training period had been completed. Regular service began over this track on the day on which the safety cars were first operated.

After preliminary instructions on the special track the men received training on the through route after 1 a.m., when no regular cars were in operation. Finally, on Friday, Jan. 31, the cars were put on the new route in the daytime, sandwiched in among the regular cars and carrying "No Passengers" signs. The safety cars followed the regular cars and were operated by the day men from 10 a.m. to 2 p.m. and by the night men from 3.30 p.m. until after 6.30 p.m. It should be stated that while on the test track the training consisted in operating the cars in turns, the men not so engaged playing the rôle of passengers. In the training special attention was given to fare collection, particularly the developing of skill in making change.

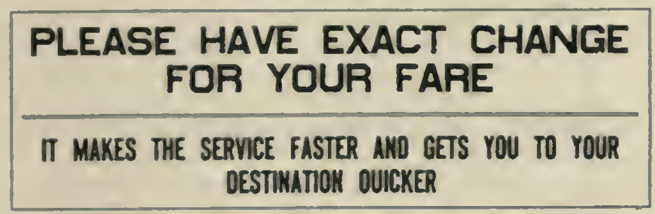
Prior to the starting of operation in Bridgeport, in addition to the above the managers and superintendents of all divisions on which it is proposed eventually to operate safety cars were called into Mr. Punderford's office for general conference so that there might be unanimity of information and enthusiasm. Sets of instruction sheets were also made up for the guidance of all men who would be engaged in the operation and maintenance of the new cars so that the experience of manufacturers and other railways which have these cars in operation might be available to all. Credit is due particularly to C. H. Beck of the Westinghouse Electric & Manufacturing Company, for compiling this material. The full information was furnished to master mechanics, starters and instructors, while a condensed set of rules was prepared for the guidance of the car operators.

The result of all this preparation was that on Sunday when the cars went into operation everything worked smoothly and, then and since, no accidents of any moment have occurred.

SAFETY CAR ON MAIN STREET IN BRIDGEPORT, CONN.

In preparing the public for the new service change-in-route signs, as reproduced on a small scale herewith, were posted in the cars some days in advance of the change. Advertisements, of which a sample is reproduced also, were run in the papers, and the local newspaper men were invited to accompany the inspection party which went over the line in special cars on the day preceding the formal opening.

For the purpose of enlisting the co-operation of the city officials and demonstrating to them the improvement in service which would result from the use of the new cars, the traffic committee of the city was invited to study them during the instruction period. This was done and the chairman of the commission personally operated a car. On the afternoon of Feb. 1, Mayor Clifford B. Wilson, who is also lieutenant-governor of the State, together with members of the Board of Alderman and representatives of the press, made a trip over the route and expressed themselves as well pleased with the rapid acceleration and stopping of the cars. They were particularly impressed with the shortness of the time needed for making emergency stops and with the lack of jar to the passengers when such stops were made.



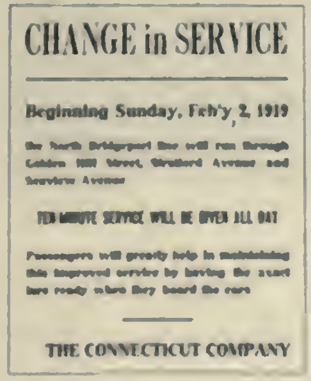
PLEASE HAVE EXACT CHANGE
FOR YOUR FARE

IT MAKES THE SERVICE FASTER AND GETS YOU TO YOUR DESTINATION QUICKER

THIS NOTICE WAS CARRIED ON THE CARS

LIMBERING UP THE EQUIPMENT

To insure smooth working of the physical equipment no pains were spared to have everything connected with the new line in perfect operating condition. Mr. Beck, already mentioned, W. G. Kaylor and E. G. Deso of the Westinghouse Traction Brake Company, and J. C. Thirlwall of the General Electric Company, gave personal attention to the cars, and every car was given an exhaustive operating test before it went into service. In order that there might not be any trouble at switches, special attention was given to seeing that all electric track switches and signals were in first-class order so that the car operators would not be obliged to leave their cars. Of course some little attention had to be given to the matter of drawing sufficient current to operate track switches with the light cars. The switches are set up so that the lighting and heating currents of the ordinary cars will not trip them. As the safety cars draw very small current normally it is necessary to cause them to draw somewhat more than normal in order to trip the switches. The overhead was also carefully inspected to provide against trolley wheels leaving the wire and thus causing traffic delays. As 14-ft. poles were used on these cars, whereas the standard on the large cars is 12 ft., there was a possibility that the "overhead," adjusted for the shorter poles would not be suitable for those on the safety cars. The track was also inspected to be sure that tangents, curves and special work were adapted to the 26-in. wheel. Extra sand boxes were provided along the route as it was expected that the new men would use sand very liberally, which proved to be the case. In fact, free use of sand is necessary with the safety cars on account of the very rapid rate of acceleration and braking which are used.



CHANGE in SERVICE

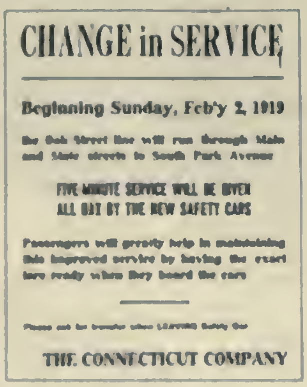
Beginning Sunday, Feb'y 2, 1919

The North Bridgeport line will run through [illegible] Street, Stratford Avenue and Seaview Avenue

TEN MINUTE SERVICE WILL BE GIVEN ALL DAY

Passengers will greatly help in maintaining this improved service by having the exact fare ready when they board the cars

THE CONNECTICUT COMPANY



CHANGE in SERVICE

Beginning Sunday, Feb'y 2, 1919

The Oak Street line will run through Main and State streets to South Park Avenue

FIVE MINUTE SERVICE WILL BE GIVEN
ALL DAY BY THE NEW SAFETY CARS

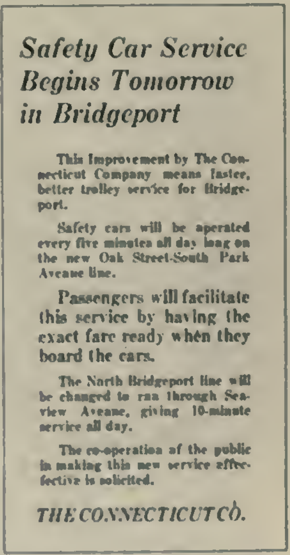
Passengers will greatly help in maintaining this improved service by having the exact fare ready when they board the cars

[illegible]

THE CONNECTICUT COMPANY

CAR POSTERS USED IN ADVERTISING CHANGES IN ROUTING

As described in the issue of the ELECTRIC RAILWAY JOURNAL for Sept. 7, 1918, the new cars were purchased from the American Car Company and they are equipped with the full complement of now-familiar safety devices. The cars are 27 ft. 9½ in. over all in length and 8 ft. wide. The height from rail to top of roof is 9 ft. 9⅝ in. The platform floor is on the same plane as the body floor, and air-operated folding doors and steps are provided. The equipment includes two 25-hp. motors, ten pairs furnished by the Westinghouse Electric & Manufacturing Company, and ten by the General Electric Company. The armature bearings are of the Gurney ball-bearing type. The total weight equipped, but without load, is about 7¼ tons. The general appearance of the car is similar to those used in other parts of the country, but the trolley pole is mounted directly on the roof instead of upon a light framework as has been customary. The outside finish is the standard Connecticut Company's yellow, and except for the length and height there is no striking difference in appearance from the company's double-truck cars.



Safety Car Service
Begins Tomorrow
in Bridgeport

This Improvement by The Connecticut Company means faster, better trolley service for Bridgeport.

Safety cars will be operated every five minutes all day long on the new Oak Street-South Park Avenue line.

Passengers will facilitate this service by having the exact fare ready when they board the cars.

The North Bridgeport line will be changed to run through Seaview Avenue, giving 10-minute service all day.

The co-operation of the public in making this new service affecfective is solicited.

THE CONNECTICUT CO.

TYPICAL NEWSPAPER ADVERTISEMENT EXPLAINING ADVANTAGES OF SAFETY CAR

RESULTS SECURED TO DATE

As this article goes to press the safety cars have been in operation more than ten days. During this period the service has been remarkably good, cars being kept very close to schedule. As they are obliged to go through a congested section of Main Street, which is quite narrow, a few traffic delays have occurred, but these were not of great moment. As the safety line is double-tracked throughout, the cars have had excellent opportunity to make up time, and by stationing starters at the ends of the line the company was able to keep them fairly well distributed. Some bunching occurred at first as would be expected in view of the short headway. The management was especially anxious to have the first day's operation perfectly smooth, which was the reason for selecting Sunday as the day. At this time of the year the Sunday travel is lightest and there is little vehicular traffic to interfere with smooth operation.

The cars are now making a schedule speed of about 8½ m.p.h., and it is hoped later slightly to increase this. The average daily mileage on Sunday is slightly more than 120, and on week days more than 130. Receipts the first day were about 20 cents per car-mile and this gradually increased to more than 22 cents.

By means of special posters, used in all cars on the division, the company asked the co-operation of the public in having exact change ready as far as posible. As a result comparatively few passengers have asked for change on the safety cars. Both management and public are pleased with the cars, as on the one hand they are proving their ability to develop business, and on the other hand they are furnishing a service impossible under former conditions. The cars in Hartford and New Haven have not yet been placed in operation but they soon will be. Of course in those cities results as striking as those obtained at Bridgeport are not to be expected, because only a few cars are available in each place, and complete lines cannot be equipped with them.

SAFETY CAR OPERATION ON A BUSY STREET IN BRIDGEPORT, CONN.

In the second monthly news letter of the electric railway section of the National Safety Council, H. B. Adams, safety supervisor Chicago, Aurora & Elgin Electric Railroad, Aurora, Ill., makes a constructive suggestion. This is that when electric railways get out printed matter along safety lines 150 copies of each piece be sent him for distribution to the members of the section with the monthly letters. This will conduce to economy in mailing expense and will greatly facilitate the safety work of members.

Treatment of Loose Railway Drum Controller Cylinders

By R. S. Beers
General Electric Company, Schenectady, N. Y.

The body castings of all K-type railway controllers are made of brass. This is to prevent as far as possible the distortion of the magnetic blowout field. For the same reason the older types of controllers, without the individual finger blowout, have a brass cap plate. In drum controllers for direct current at lower voltages, as well as in those for alternating current, cast iron has been successfully used for the body castings.

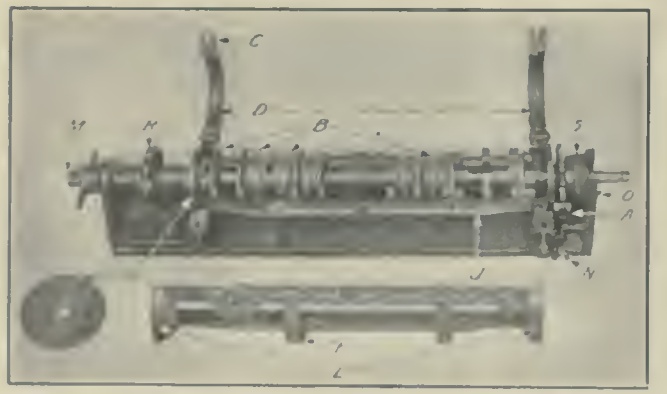
The first K-controller cylinders were made with the segments and body castings insulated from the shaft by means of a wood drum. As the art developed molded insulation replaced the wood, reducing the diameter of the cylinder casting and allowing a better separation of adjacent fingers and segments by the arc deflector plates. Cylinders made in this manner eventually loosen on the shaft from the hammer blow of the segments striking the fingers, as well as from the jar when the cylinder is turned to the "off" position. On account of the body castings becoming loose a third type of controller cylinder has been devised and used for a number of years. This is known as the "hexagon-shaft type," and is now furnished with all K-type controllers. It consists of a hexagon steel shaft wrapped with a tough insulation that is molded to the shape of the shaft. The body castings are provided with a hexagonal hole and are held firmly to the shaft by set screws and keys. This type of construction effectually prevents the body castings from becoming loose.

When cylinders of the hexagon-shaft type are assembled it is essential that a felt or cloth washer be used at each end of the body casting, as otherwise small particles of copper from the fingers and segments will work their way between the body castings and shaft and eventually cause a short-circuit between two adjacent body castings.

When the body castings on a cylinder of the round-shaft molded-insulation type become loose, either one of two methods may be used to correct it. The first is to replace it with a cylinder of the hexagon-shaft type and prevent a repetition of the trouble. While this is the most expensive method it is urgently recommended, particularly where there are but few cylinders to be repaired. Where there are many controllers to be repaired and a man can be well trained in the repair work the second method of reinsulating the old cylinders is the most economical. While reinsulating old cylinders costs little for new material, since only the the insulation has to be purchased, a considerable original expense for a heating fixture must be incurred, and skill in manipulation must be attained by long practice before satisfactory results can be expected.

The usual practice is to heat the old cylinder sufficiently so that the body castings can be easily removed; then all the old insulation is cleaned from the shaft and body castings. The new insulating bushings and keys are put on the shaft and the body castings are slipped over the bushings, enough bushings are used to give an over-all length of about 2½ in. more than the length of the insulation on a completed cylinder.

Referring to the accompanying illustration which is for a K-28 controller, it will be noted that the cylinder is put in the lower half of the cradle *J* and turned until the off-position star-wheel notch is approximately in line with the parting line of the cradle. Then the body castings are shifted until the segment screwholes register with similar holes in the cradle, and the body castings are fastened to the cradle by screws through these holes. The clamps *B* should be put on the cylinder and screwed up tight. These clamps form a solid wall between the adjacent body castings so that pressure can be applied to force the compound into all the space between the shaft and body castings. When sufficient compound has been forced in this is indicated in a general way by its squeezing out through the cracks between clamps and body castings. The disk *G* and the collar *S* should be put on the shaft and the cylinder and cradle placed in the fixture.



HEATING FIXTURE FOR REINSULATING K-28 CONTROLLER

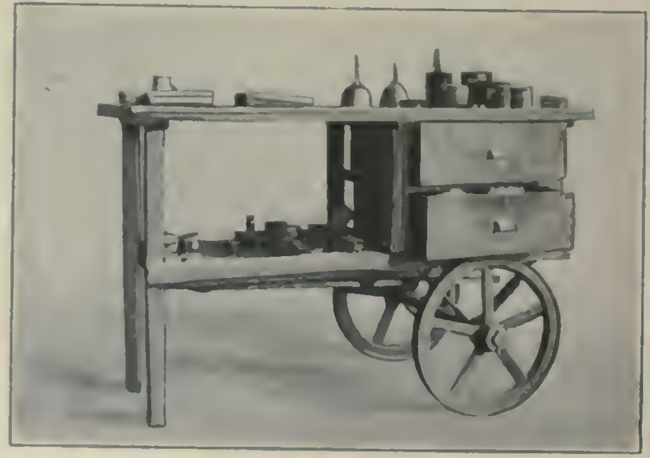
The shaft should then be centered by means of screw *M* which will bring the star wheel in line with the pawl *A*. The pawl should be placed in the off-position notch of the star wheel, and the wing nuts *N* and *O* tightened to hold the shaft firmly in place. The upper half of the cradle *F* is now put on, the halves of the cradle are fastened together, and the cradle and castings on the insulation are turned until pins *D* register with holes *L* in the cradle *F*. The clamps containing the pins should then be fastened. This completes the setting up operation and the cylinder is ready for heating.

Originally a gas fixture was used for heating. This has the disadvantages of poor heat control and the likelihood of overheating the compound on the outer surface without softening it around the shaft. The best heating device is a simple electric oven made of sheet steel lined with asbestos and in the shape of a controller cover. If its dimensions are about 13 in. long, 13 in. high and 13 in. wide, and the ends are open, it can be easily placed over the heating fixture and the ends closed with loose pieces of sheet steel or transite. An oven of these dimensions will cover about half the cylinder as it should because the compound cannot be forced to the far end of the cylinder with sufficient pressure if the entire cylinder is heated on account of the leaks between the clamps *B* and the body castings. For this reason the section nearer the star wheel and farther from the pressure wheel *R* should be heated first.

The heating element can be made up of resistance wire wound like a coiled spring and cleated to the inside of the oven. Five or 6 ft. of flexible lead should be used to connect the oven to the current source so that it may be moved readily. The resistance should absorb about 1600 watts, or 3 amp. from a trolley circuit. The oven should have a small hole in the top near the center so that a thermometer can be put in. and a temperature of between 90 and 110 deg. C. (195 and 230 deg. F.) maintained while heating the cylinder. This temperature will soften the insulation in from ten to fifteen minutes so that it will readily flow when pressure is applied by the handwheel *R*. Pressure should be applied gradually until the compound is forced out between the clamps and body castings. The oven should now be moved over the lower half of the cylinder and this section heated and pressure applied. As the cylinder is thoroughly warm only about ten minutes will be needed before the insulation is soft enough to flow under pressure. With this operation the pressure wheel *R* should be turned up until the disk *G* strikes the clamping ring *C*. This completes the heating operation, but the cylinder should remain in the heating fixture for fifteen or twenty minutes so that the compound may cool and harden sufficiently to hold the body castings in place when the fixture and cradle are removed.

Handy Portable Table for Car Painters

THE accompanying picture shows a form of table which has proved to be a great convenience to the finishers in the paint shop of the Rhode Island Company, Providence, R. I. The top is covered with a heavy glass plate, and the shelf and drawers provide convenient receptacles for waste, sand paper, etc.



PORTABLE WORK TABLE FOR CAR FINISHER OR SIGN PAINTER

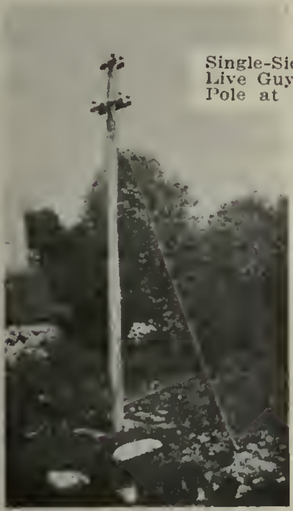
The tables are run into the oil room or the sign room at night, where they are out of the way and always available for immediate use.

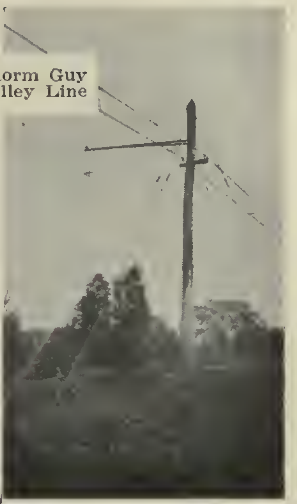
The Sheffield (England) *Daily Telegraph* recently printed results of an interview with the city surveyor who paid a tribute to the electric welding process in enabling the Sheffield Tramways to maintain track through the war period. Upward of 8000 joints have been made and these have stood up very well.

Examples of Pole Guying from Other Fields

This Article Deals Especially with Protection Against Strains Due to Storms—It Refers Also In An Introductory Way to the Subject of Pole Preservation

BY CHARLES RUFUS HARTE
Construction Engineer, The Connecticut Company,
New Haven, Conn.


Single-Side Storm Guy; Live Guy from Next Pole at Base

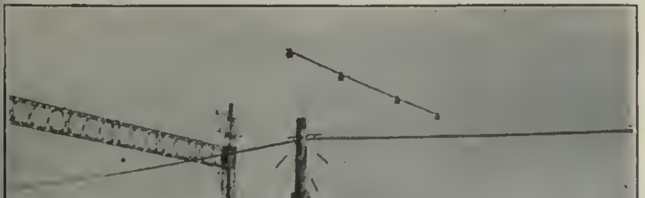

Four-Way Storm Guy on Trolley Line

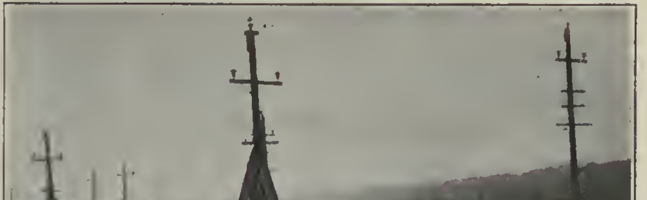
THE reader of this series of articles, on observing the title of the present one, may be inclined to ask as did the man who fell asleep in the midst of a curtain lecture, and was waked for further words by the angry lady, "Yet or again?" but the subject is of sufficient importance to warrant considerable attention, particularly since, although it has been carefully worked up and standardized by the oldest and largest users of pole lines, very little of the details seems to be known outside of telegraph and telephone circles. That any considerable body of men follow a given practice does not necessarily prove that it is right, but where question of its correctness does arise the fact of such general use is helpful evidence that it is not a previously untried and therefore questionable procedure; while the fact that it has been continued for some time is at least reasonable ground for the presumption that it is successful. It frequently happens that the authorities having jurisdiction possess ideas of their own as to what is proper construction, or that the owner of a paralleling line or an abuttor becomes concerned over possible dangers from the line, or it may be that the line has a neighbor dangerous because of scanty guying. In such times knowledge of what "the other fellows" do is invaluable, for to the average commission or court actual satisfactory practice is worth any amount of calculations.

Storm guying, to protect the line from damage by wind and sleet storms, is in general applied to straight sections, or to curves so gradual as to require no guying to meet the "pull;" it is in addition to such guying as has been discussed heretofore, and while primarily intended to meet the special stresses of storms, it also serves to strengthen the line very materially against other disturbances.

It is evident that there are three factors in the effect of a given storm on a line: (1) The length of the section between main anchor points, (2) the lengths of the individual spans in the section and (3) the number of wires in the line. The first two are constant for any given line, practically throughout its life. The third is quite likely to be materially increased in the course of time with the development of business, particularly in the case of the communication companies. As will be seen by reference to the accompanying table the Western Union and the American Telephone & Telegraph companies provide for this contingency by reducing practically by half the distances between existing storm guys as soon as the number of wires carried increases beyond certain limits. In a few instances in addition the guying at the old points is increased.

Storm guys do not in any way differ from other guys in make-up, except that it is considered desirable to give them independent anchors, and not to attach them to the butts of other poles of the line; for the same reason, that is, that they may be unaffected by storm troubles, they should not be attached to trees. The Western Union employs 4000-lb. strand for lines of 12-wire capacity, carrying at least seven wires, 6000-lb.


FOUR-WAY STORM GUYING ON CABLE POLE WITH LARGE SHOE


A GOOD EXAMPLE OF STORM BRACING OF A TRANSMISSION LINE

strand for larger lines carrying from eleven to fifty wires, and 10,000-lb. strand for lines carrying from fifty-one to eighty wires, except that, if the increase in loading normally would require 10,000-lb. strand on a pole already guyed with 6000-lb. strand, these latter are not disturbed, but are reinforced by additional 6000-lb. strand guys. The A. T. & T. Co. uses 6000-lb. strand, as a rule, on lines of from 40- to 60-wire capacity but employs 10,000-lb. strand on such lines if the guy "lead" is limited to one-fifth or less of its "height," and it also employs the stronger strand on all seventy and eighty-wire lines.

In the point of attachment there is a little difference between the practice of these two companies. The Western Union places all storm guys for 12-wire lines under the first (the top) gain, but for lines of greater

Storm Guy Spacing, Telephone and Telegraph Practice

Poles per Mile	Spans, Feet	Size of Line, Wires Ultimate	Present	No. of Spans in Section	Length of Section in Feet	Location of Storm Guys Spans Apart	Feet Apart	Limits of Odd Group Spans	Feet
					WESTERN UNION				
Under 40	Over 132	40	10 or fewer	Unlimited	Unlimited	None required			
			11 to 20	63 or fewer	8,316 or less	None required			
				64 or more	8,448 or more	Every 32	4,224	17 to 48	2,244 to 6,336
			21 to 30	31 or fewer	4,092 or less	None required			
				32 or more	4,224 or more	Side every 16; full every 32	Side 2,112; full 4,224	9 to 24	1,188 to 3,168
			31 to 40	31 or fewer	4,092 or less	None required			
			..	32 or more	4,224 or more	Every 16	2,112	9 to 24	1,188 to 3,168
40 to 49	132 to 107	60	10 or fewer	Unlimited	Unlimited	None required			
			11 to 20	79 or fewer	10,428 or less	None required			
				80 or more	10,560 or more	Every 40	5,280 to 4,280	21 to 60	2,247 to 7,920
			21 to 30	39 or fewer	5,148 or less	None required			
				40 or more	5,280 or more	Every 20	2,640 to 2,140	11 to 30	1,177 to 3,960
			31 to 50	19 or fewer	2,508 or less	None required			
				20 or more	2,640 or more	Side every 10; full every 20	Side 1,320 to 1,070 Full 2,640 to 2,140	6 to 15	642 to 1,980
			51 to 60	19 or fewer	2,508 or less	None required			
				20 or more	2,640 or more	Every 10	1,320 to 1,070	6 to 15	642 to 1,980
50 or more	106 or less	80	10 or fewer	Unlimited	Unlimited	None required			
			11 to 20	111 or fewer	11,766 or less	None required			
			..	112 or more	11,872 or more	Every 56	5,936	29 to 64	3,074 to 8,904
			21 to 30	55 or fewer	5,830 or less	None required			
				56 or more	5,936 or more	Side every 28; full every 56	Side 2,968, full 5,936	15 to 42	1,590 to 4,452
			31 to 40	55 or fewer	5,830 or less	None required			
				56 or more	5,936 or more	Every 28	2,968	15 to 42	1,590 to 4,452
			41 to 50	27 or fewer	2,862 or less	None required			
				28 or more	2,968 or more	Every 14	1,484	8 to 21	848 to 2,226
			51 to 80	13 or fewer	1,378 or less	None required			
				14 or more	1,484 or more	Side every 7; full every 14	Side 742; full 1,484	5 to 11	530 to 1,166
					A. T. AND T.				
46	130	40	10 or fewer		.....	.....			
			11 to 20	Fewer than 80	Less than 10,400	None required		...	..
			...	80 to 96	10,400 to 12,480	Middle pole	5,200 to 6,240		
				97 or more	12,610 or more	Every 40 from each end	5,200	9 to 48	1,170 to 6,240
			21 to 30	Fewer than 31	Less than 4,030	None required			
				31 to 60	4,030 to 7,800	Middle pole	2,015 to 3,900		
				61 or more	7,930 or more	Every 20 from each end	2,600	11 to 30	1,430 to 3,900
			31 to 40	Fewer than 16	Less than 2,080	None required			
				16 to 30	2,080 to 3,900	Side only on middle pole	1,040 to 1,950	..	
				31 or more	4,030 or more	Side every 10; full every 20	Side 1,300; full 2,600	11 to 15*	1,430 to 1,950
46	130	50	21 to 30	Fewer than 80	Less than 10,400	None required		...	
				80 to 96	10,400 to 12,480	Middle pole	5,200 to 6,240		
				97 or more	12,610 or more	Every 40 from each end	5,200	9-48	1,170 to 6,240
			31 to 40	Fewer than 31	Less than 4,030	None required			
				31 to 60	4,030 to 7,800	Middle pole	2,015 to 3,900		
				61 or more	7,930 or more	Every 20 from each end	2,600	11-30	1,430 to 3,900
			41 to 50	Fewer than 16	Less than 2,080	None required			..
				16 to 30	2,080 to 3,900	Middle pole	1,040 to 1,950		..
				31 or more	4,030 or more	Side every 10; full every 20	Side 1,300; full 2,600	11 15*	1,430 to 1,950
46	130	60	21 to 30	Fewer than 112	Less than 14,560	None required		..	
			..	112 to 124	14,560 to 16,120	Middle pole	7,280 to 8,060		..
				125 or more	16,250 or more	Every 56 from each end	7,280	7 to 62	910 to 8,060
			31 to 40	Fewer than 46	Less than 5,980	None required			
				46 to 62	5,980 to 8,060	Middle pole	2,990 to 4,030		
				63 or more	8,190 or more	Every 28 from each end	3,640	7 to 45	910 to 5,850
			41 to 50	Fewer than 20	Less than 2,600	None required			
				20 to 34	2,600 to 4,420	Middle pole	1,300 to 2,210		
				35 or more	4,550 or more	Every 14 from each end	1,820	7 to 17	910 to 2,250
			51 to 60	Fewer than 10	Less than 1,300	None required			
				10 to 17	1,300 to 2,210	Side only on middle pole	630 to 1,105		
				18 or more	2,340 or more	Side every 7; full every 14	Side 910; full 1,820	7 to 9 †	910 to 1,170
53	100	70	21 to 30	Fewer than 112	Less than 11,200	None required			
				112 to 124	11,200 to 12,400	Middle pole	5,600 to 6,200		
				125 or more	12,500 or more	Every 56 from each end	5,600	7 to 62	700 to 6,200
			31 to 40	Fewer than 46	Less than 4,600	None required			
				46 to 62	4,600 to 6,200	Middle pole	2,300 to 3,100		
				63 or more	6,300 or more	Every 28 from each end	2,800	7 to 45	700 to 4,300
			41 to 50	Fewer than 20	Less than 2,000	None required			
				20 to 34	2,000 to 3,400	Middle pole	1,000 to 1,200		
				35 or more	3,500 or more	Every 14 from each end	1,400	7 to 12	700 to 1,200
			51 to 70	Fewer than 10	Less than 1,000	None required			
				10 to 17	1,000 to 1,700	Side only on middle pole	500 to 850		
				18 or more	1,900 or more	Side every 7; full every 14	Side 700; full 1,400	7 to 9 †	700 to 900
59	90	80	21 to 30	Fewer than 112	Less than 10,080	None required			
				112 to 124	10,080 to 11,160	Middle pole	5,040 to 5,580		
				125 or more	11,250 or more	Every 56 from each end	5,040	7 to 62	630 to 5,580
			31 to 40	Fewer than 46	Less than 4,140	None required			
				46 to 62	4,140 to 5,580	Middle pole	2,070 to 2,790		
				63 or more	5,670 or more	Every 28 from each end	2,520	7 to 43	630 to 4,030
			41 to 60	Fewer than 20	Less than 1,800	None required			
				20 to 34	1,800 to 3,060	Middle pole	900 to 1,530		
				35 or more	3,150 or more	Every 14 from each end	1,260	7 to 17	630 to 1,530
			61 to 80	Fewer than 10	Less than 900	None required			
				10 to 17	900 to 1,530	Side only on middle pole	450 to 765		
				18 or more	1,620 or more	Side every 7; full every 14	Side 630; full 1260	7 to 9 †	630 to 810

The odd group is kept within the limits marked * or † by omitting nearest guys if these reduce it too much, or by putting side guys on middle pole, if otherwise it would be too long.

capacity puts the first head guys under the first gain, the first side guys under the second gain, the second set of head guys, if such are required, under the third gain, and the second side guys under the fourth gain. The A. T. & T. Co. places all guys under the second gain, except at terminal poles taking two 6000-lb. guys, where the second guy goes below the fourth gain.

Where it is difficult or impossible to place side guys for storm protection, if the nature of the right of way permits, "H" fixtures consisting of two matched-as-to-size poles are often employed, the Western Union in general limiting their use on 41- to 60-wire lines to points where the side-guy lead would be less than one-quarter the height, and on 61- to 80-wire lines to points where the lead would be less than one-third the height. The Western Union sets the poles vertical and 6 ft. 3 in. apart center to center, and braces the crossarms with one strap from each pole, located on the inside. The A. T. & T. Co. sets the butts about 7 ft. apart, center to center, and rakes the tops toward each other to about 18 in. apart. The crossarms have a single strap brace from each pole, all but those on the bottom arm being on the outside. The bottom arm is braced inside. The crossarms themselves take standard spacing. If the poles are vertical, standard arms can be used, although the pole pins are apt to be too close; with raked poles there is almost certain to be interference unless special arms are employed, or unless where two are close together one is not used.

The H-frame is considered the equivalent of side guys in both directions; if it requires head guys these, if in both directions, are attached to the same pole. If there are two or more adjacent fixtures the head guys are placed on alternate poles, right and left.

Coming now to practice, the Western Union does not storm guy 12-wire lines, except on gradual curves eight or more spans in length on which the average pull is between 2 ft. and 5 ft. (between 1.6 ft. and 3.9 ft. A. T. & T. basis) and then only when more than six wires are installed. With such a curve, between eight and fifteen spans in length, the middle pole is side guyed away from the curve; with a length of more than fifteen spans, every eighth pole, counting from one end, takes such a side guy away from the curve, except that if the last eighth pole leaves only three or fewer spans to the end it is omitted. On lines of more than twelve wires capacity storm guys are employed only upon straight sections and upon curves, the poles of which have a pull not in excess of 3 ft. (2.3 ft. A. T. & T.). The first pole of heavier pull, however, is considered in counting as belonging to the section.

Although at first glance at the storm-guy table there would seem to be marked difference between the Western Union and the A. T. & T. practice, this is largely due to the different classifications of the two companies. The actual results in the main are much the same, the chief difference arising from the fact that the Western Union counts through from one end to the other, making the further end group the old one, unless the section contains just an even number of groups, while the A. T. & T. Co. counts in from both ends, making the middle group the odd one. On lines carrying nearly their ultimate capacity, if laying off the prescribed groups leaves the center group too small, the nearest guys are omitted; if too large, the middle pole is given side guys. The particular limits for both companies are shown in detail on the guying table. The Western Union omits the nearest guy if the odd end group is otherwise too short.

A FEW WORDS ON POLE PRESERVATION

Up to now we have considered elements common to all kinds of overhead construction and before taking up cross arms and pins, which differ according to the nature of their use it may be well to turn back to the subject of preservative treatments for poles.

A comparatively few poles are destroyed by fire or by mechanical injury, but by far the most important agent for mischief is decay, in which fungi play the leading part, although bacteria also are involved, but in a way as yet but little understood. Different species of fungi have different methods and results, but in general the spores, which correspond to the seeds of the higher plants, get into the sap wood through some mechanical injury, and, getting the air, moisture and heat without which they cannot develop, extend the thread-like "hypæ," which form the real fungus between the cells forming the wood. In life these cells, the walls of which are cellulose, are first filled with fluid, which gradually dries out while various substances are deposited which tend to color it and to make it waterproof while at the same time it is being covered with increasing thicknesses of newer cells. As time goes on, therefore, these cells become less and less subject to decay, other things being equal, their walls resisting the action of such hyphæ as may extend to them while the layers of cells outside help keep the hyphæ out. Under favorable conditions, however, the hyphæ force their way between the cells, and feeding first upon the sugars, starches and oils in the cells, presently attack and break down the cell walls, converting them into a structureless mass with no strength at all. Bearing in mind the fact that this action can occur only when the fungus has air, moisture and heat, it is obvious that the best way to prevent decay is to keep the fungi out; that next to this would be the elimination of air, moisture and heat, so the fungus could not attack the cell contents; and finally so to treat the cell or the cell contents that the fungus would be poisoned or at least prevented from causing trouble.

COMBINED STORM AND ANGLE GUYS

Whatever may be the form of the offensive against the fungus, it is clear that reducing the amount of food is a good defensive step and this is effected by "seasoning," or the drying out of as much as is practicable of the fluids, which, however, must not be done too rapidly, for in that case the wood is apt to split and "season check" very badly. The actual time required, and the percentage of moisture which can be removed depends upon the kind of wood, and to a lesser extent, to the time when cut, and the character of the soil in which it grew. Spring-cut wood gets the benefit of all the hot weather; fall-cut wood goes through the winter with but a fraction of the seasoning obtained in the same length of time in the summer, Government records showing that chestnut, spring-cut, reduced its moisture content from 83 per cent to 51.7 per cent in 180 days, while winter-cut stock in the same length of time had reduced its moisture content from 85.6 per cent to 56.8 per cent, and fall-cut stock had gone from 85.4 per cent to 62.2 per cent, requiring 360 days to reduce the moisture content to 47.8 per cent.

Where time permits, natural seasoning is much the best, but it is not infrequently necessary to accelerate the work by artificial drying in kilns or ovens, or by steaming. Wood so treated, however, reabsorbs moisture very rapidly and is liable to be weakened by overheating, particularly in steam drying.

If the poles are to be air dried they should be peeled free of all bark and then spread out on skids sufficiently high to keep them clear of any brush or vegetation, and the poles should not touch each other, in order to give free circulation of the air about them. The Government found that under such conditions various kinds of poles at different points required the following periods in which to season air-dry:

		— Months Required to Season —			
Kind of Pole	Place of Test	Spring Cut	Summer Cut	Autumn Cut	Winter Cut
Chestnut	Parkton, Md	5	4	8	7
Southern white cedar	Wilmington, N. C.	3	3	8	5
Northern white cedar	Escanaba, Mich	12	9	7	6
Western red cedar	Wilmington, Calif	4+3	5+6	3+7	3+4
Western yellow pine	Madera County, Calif	5	3	9	6

(From Forestry Service Bulletin 84)

With this brief introduction the subject of pole preservation will be left for the time. In a later article it will be taken up in some detail.

Important Committee of C. E. R. A.

THE following committee on interurban freight and motor-truck competition has been appointed in accordance with the resolution adopted at the Indianapolis meeting of the Central Electric Railway Association on Nov. 22, 1918 (see issue of this paper for Nov. 30, page 953): Indiana members—Bert Weedon, Interstate Public Service Company, Indianapolis; J. A. Greenland, Fort Wayne & Northern Indiana Traction Company, Fort Wayne; James H. Drew, Drew Electric & Manufacturing Company, Indianapolis. Michigan members—W. S. Rodger, Detroit United Lines; F. W. Brown, Michigan Railway, Kalamazoo; F. N. Root, Root Spring Scaper Company, Grand Rapids. Ohio members—F. R. Coates, Toledo Railways & Light Company; E. F. Schneider, Cleveland, Southwestern & Columbus Railway, Cleveland; S. D. Hutchins, Westinghouse Traction Brake Company, Columbus.

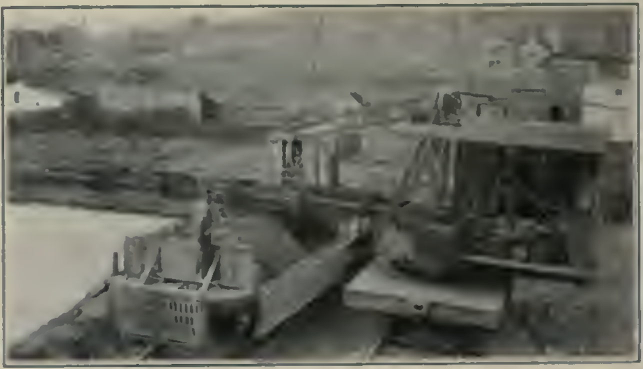
Unloader Empties a 22-Cu.Yd. Car in Fifteen Minutes

An Unloading Machine Made From an Ordinary Five-Ton Portable Crane Is Also Used to Level Off Dirt at the Dump

By W. D. CHAMBERLIN
Assistant Chief Engineer United Railroads of San Francisco

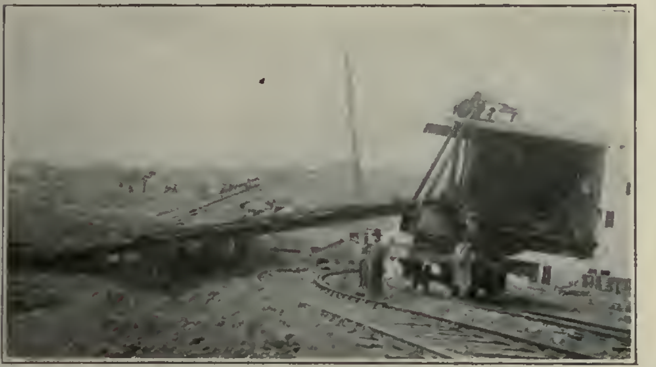
THE United Railroads of San Francisco operates several types of construction cars, including hopper-bottom, side-dump and flat-bottom, the last-named being largely used on track reconstruction jobs for hauling earth from the track trench to the dump. The same dump has been used for several years and is located in the low marsh lands of the city, where a track is run along the edge of a bank about 15 ft. high over which the debris from the car is dumped. Up to about eight months ago the cars were unloaded by hand, a crew either being stationed at the dump all day or being taken to and from the dump on the car. The expense of unloading was considerable, as a gang of six to eight men was usually employed at this work.

The cost of unloading has been greatly reduced by the introduction of an unloading machine designed and built by the United Railroads' engineering department several months ago. This unloader is illustrated in the photographs reproduced herewith. An ordinary 5-ton portable crane, which this company converted into an electric shovel in 1907, is used. The shovel, boom and bucket were removed and replaced with a special 30-ft. boom equipped with a "pusher plate" which rolls along the full length of the boom on four wheels. This pusher plate is actuated by two steel cables attached to the top and bottom of the crane drum which give the plate a forward and backward motion along the boom as desired. The boom and "pusher" are made of two 9-in., 106-lb., steel rails, old cable-slot rails and other second-hand material, the general design being shown in the photographs. The inside base flange of the 9-in rails forms a track on which the "pusher" wheels run. The boom can be raised or lowered and swung in a complete circle as is found necessary. It is attached to the main drum shaft of the crane.



UNLOADING A CAR BY USING THE CAR UNLOADER

Two parallel tracks are located along the dump, the car to be unloaded being placed on the track nearest the edge of the bank and the unloader being placed on the other track opposite the car. The car shown has a cab in the middle. Other cars have a cab at each end, and either type can be used. To unload a car the side boards are dropped and the unloader boom is swung across the car in a horizontal position with the "pusher" at the crane end. The "pusher" is moved forward over the edge of the car floor and the boom is then lowered until the plate rests firmly on the floor. The "pusher" is then moved forward, pushing off one-sixth of the load or nearly 4 cu.yd. The crane is then moved to a new position. Six movements usually unload a 22-yd. car in about fifteen minutes.



LEVELING OFF THE EARTH AT THE EDGE OF THE DUMP

When five or six cars are unloaded each day, the car operator and two helpers handle the car to and from the construction job and also do the unloading. If more cars are handled it is necessary for the operator to stay at the dump all day.

The earth from the car does not immediately roll down the dump bank, as the track is usually too far from the edge. It is forced over the bank by lowering the boom after the car has been removed and moving the "pusher" forward as shown. As the track is 300 ft. long it is necessary to do this only when earth has been dumped all along the track, which may require several days. The dump can be used several months without moving the track nearer the bank, as the 30-ft. boom makes it possible to use the dump with the car track 20 ft. from the edge of the bank, thus also reducing track moving expense.

The device is also used successfully to assist in moving the track out on the new embankment after the material has been scraped off to the proper level. This is done by putting a chain around a tie and thence to the "pusher plate." The boom is then raised slightly and the pusher plate is advanced toward the end of the boom. With usual track spacing and with the unloader on the inner track the outer track can be moved out on the embankment 10 ft. or 12 ft. at a single lift. Recently 120 ft. of track was so moved in several consecutive lifts, the entire operation taking only about twenty minutes. This same work done by the usual hand methods would have taken a crew of six or seven men at least a half day.

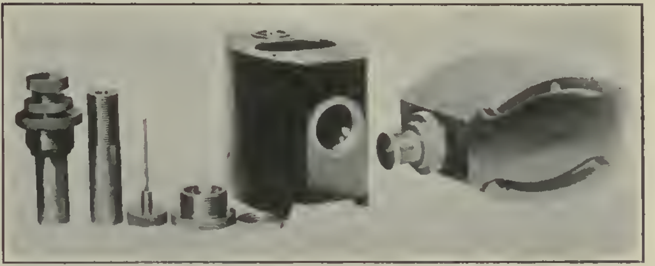
The unloader has also been used for shifting the track on which it stands. This is accomplished by putting the pusher plate at the extreme end of the boom and chaining it to a tie. The boom is then swung sidewise. The track can be moved 2 ft. or 3 ft. at a single operation and this process is repeated as the unloader moves along the track. This operation, however, leaves the track in such shape that the unloader cannot again operate on the moved rails until the track has been worked down to its new bed.

There may be questions as to why the unloading process could not be as successfully done by hopper-bottom cars or side-dump cars. Hopper-bottom cars require that the materials be afterwards spread by hand; side-dump cars often require that the men shoveling into the cars lift the material 7 to 9 ft. Even with the side dump cars it is still necessary to level off the dumped material by hand. The flat cars shown in the pictures are only 3½ ft. to 4 ft. above the rail.

The cost of work at the dump has been reduced by the new apparatus to about one-third of the former cost by hand labor. The crane is still available for shovel work if desired, as the unloader boom can be replaced by the shovel boom in a short time.

Device for Use in Measuring Dielectric Strength of Oils

IN MEASURING the dielectric strength of oil it is necessary to immerse a spark gap in the oil. To do this ordinarily requires a large sample of oil and a high voltage for use across the gap. The Westinghouse Electric & Manufacturing Company has just developed a device for the purpose of securing reliable indications with a minimum sample of oil and a relatively low testing voltage. It consists of a molded cup in one piece, with brass electrode bushing threaded to receive packing glands. Electrodes are made from brass cylinders 1 in. in diameter, threaded at one end to receive a lock nut, with a binding post on the outside end for connection to the transformer leads. A steel feeler gage for setting the gap at exactly 0.1 in. is provided and is attached to one of the binding posts when not in use.



PARTS OF OIL TESTING CUP AND COMPLETE CUP FOR USE IN MEASURING DIELECTRIC STRENGTH OF OIL

The testing cup weighs 6½ leb. net and requires a 4-oz. sample of oil. A voltage of 25,000 is sufficient for reliable testing, and seldom more than 30,000 volts would be required to discharge across the standard gap (0.1 in.) through any insulating oil.

The subways in New York are not the only railways which have trouble in handling the crowds at the rush hour. In reply to complaints of congestion on the London Underground Railways and the London General Omnibus Company, H. E. Blain, operating manager, stated that the Underground Railways are carrying 30 per cent more passengers than in the pre-war days. To insure public safety it has been necessary at times to limit the rate at which passengers are admitted to the underground stations.

INTERIOR VIEW—NOTE PROVISION FOR ADDITIONAL UNITS.

HIGH-TENSION BUS STRUCTURE ON CONCRETE BENCH

A Well-Lighted and Well-Ventilated Substation

New Substation of Kansas City Railways Is Fourth in Rehabilitation Program, Is of Pleasing Architecture and Has High-Tension Equipment and Oil Switches Advantageously Located

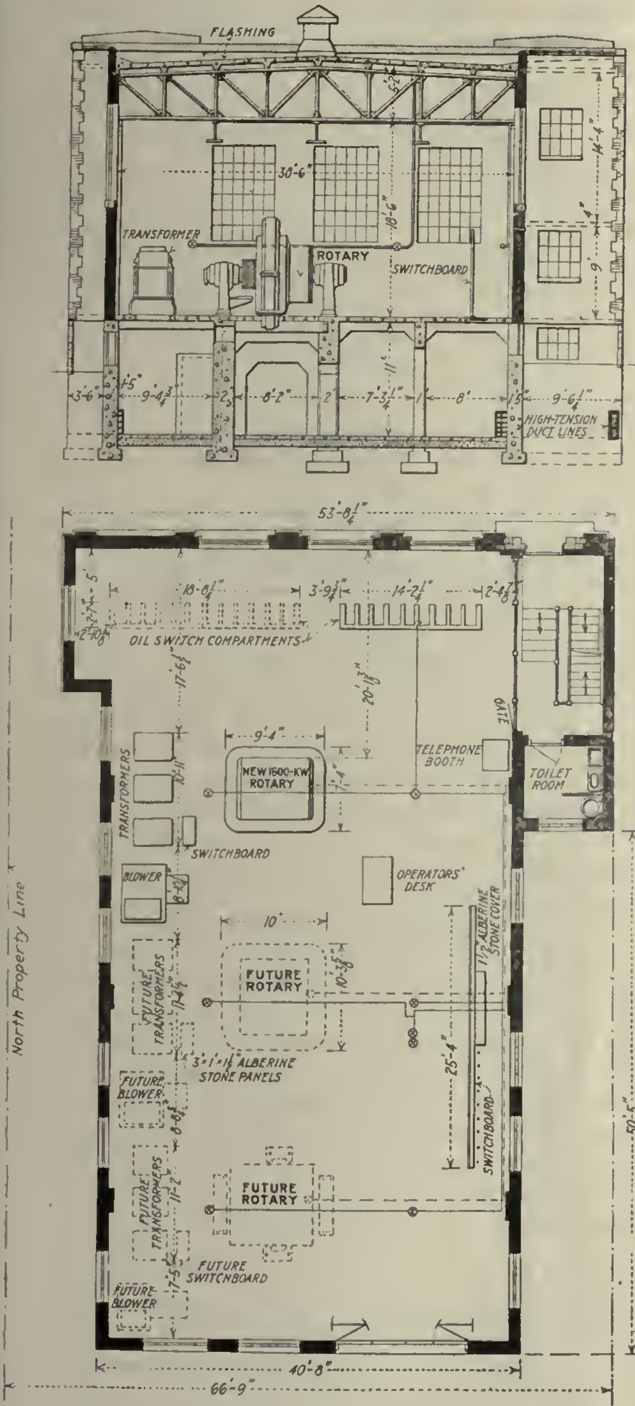
BY S. H. GRAUTEN
Electrical Engineer Kansas City (Mo.) Railways

THE Kansas City Railways recently placed in commission a new substation located at Thirty-first Street and Montgall Avenue, in the rapidly growing southeast section of the city. It is the fourth of seven substations included in the rehabilitation program of the distribution system of this company. It is within 300 ft. of the intersection of the Thirty-first Street and Prospect Avenue car line, which intersection was the theoretically best location. Considerable expense was saved, however, by selecting a lot around the corner from this intersection, back to back with the ideal site.

The substation is designed for three units with ample space for the largest units manufactured. The initial installation consists of one 1500-kw. unit, which is the first unit of less than 3000-kw. capacity purchased by this company in several years. The use of the smaller unit is, however, in line with the tendency to locate substations at more frequent intervals. As the building is located on a residential street it was necessary to provide an exterior which would harmonize with the immediate surroundings. The services of an excellent firm of architects were secured to insure an attractive building facade. The general plans were prepared by our draftsmen. The front of the building is shown in the accompanying elevation. The front and the returns are of brown matt-finished brick of mingled shades, with cornice, coping, sills and entrance details of Carthage limestone. The sash are of steel with maximum ventilator sections. The roof slab is of concrete carried on steel trusses. The shape of the building insures light and air regardless of the building up of the adjoining property, and at the same time is well suited to the future development of the site. The entrance is located in the southeast corner of the building, one short flight leading up to the main floor and a slightly longer flight down to the basement from the landing on the entrance level. In the same wing is located the toilet, and the room directly below is used as a battery room. A gallery is installed in the area above the entrance and toilet and this will serve for lightning arresters for future overhead high-tension lines. A feature of the layout is the location of the high-tension equipment and oil switches at the front end of the building instead of the usual position back of the transformers. This arrangement has the advantage of removing the high-tension equipment from the confines of the air chamber and also places the oil switches within easy vision of the operator. The air chamber is thus left clear of the equipment

A SUBSTATION SUITED TO A RESIDENCE DISTRICT which usually largely fills it, the only high-tension equipment in the chamber being an end bell under each bank of transformers and the leads to the transformer terminals.

The substation was laid out with a view to providing ample operating space, light and ventilation. The rotary foundations, instead of being the usual solid walls, are constructed of heavy columns and girders, allowing free circulation of air to the machines. The main floor is sufficiently above grade to permit the use of windows in the basement for the entrance of light and air while the windows on the main floor have been placed unusually high. Three ball-bearing ventilators are installed on the roof. There is thus provided a definite natural circulation of air, the cool air, entering through the basement windows, rises through the rotary openings and passes out through the upper sash and ventilators.



VERTICAL SECTION AND FLOOR PLAN OF NEW SUBSTATION

The oil switches used are the General Electric type H-3 with sub-cell disconnect switches. As the arrangement places all of the operating equipment on the main floor—there is no need for the operator to go to the basement during switching operations. This saves time and cuts down the risk of mistakes. The high-tension bus structure, of gray pressed brick with horizontal slabs of reinforced concrete, is built on a concrete bench 5 ft. 5 in. high, raising the bus from the floor and shortening the leads to the oil switches located directly above.

The rotary at present installed is of the latest design General Electric 1500-kw., six-phase, 25-cycle machines, with commutating poles. It is arranged to start from a single tap with resistance grids in the starting leads to limit the starting current. The transformers are of the single-phase air-blast type, wound for both 6600 and 32,000 volts with two 2½ per cent taps and four 2½ per cent taps below these voltages. They have an inherent reactance of about 12 per cent. The transformers are at present operated at 6600 volts, the 13,200-volt winding being provided for future increase in transmission voltage.

The switchboard consists of the usual rotary alternating-current and direct-current panels, high-tension panels, a battery panel and 600-volt feeder panels. The feeder panels are equipped with an auxiliary bus and double-throw switches, allowing cleaning of breakers or repair without interruption of service, and without the use of jumpers on the back of the panels. The oil-switch control circuits are supplied from an Exide D-7 control battery, which is of sufficient capacity to carry the emergency-lighting circuits. The battery is arranged to charge nominally from a 4-kw. motor generator set but may be charged through a fixed resistance from the 600-volt bus. The control circuits may also be carried on the motor-generator set. An automatic throw-over switch is provided, which, on failure of usual 600-volt lighting, automatically energizes the emergency lights from the battery. This switch also protects the battery from discharging back into the feeders, should the battery happen to be on charge at the time of loss of 600-volt power by opening the 600-volt charging circuit to battery.

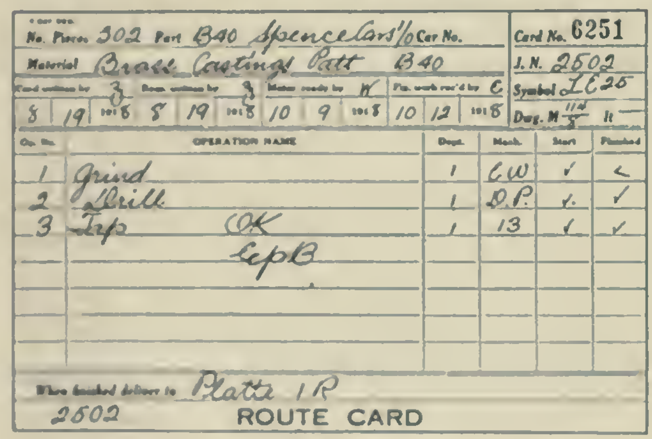
The 600-volt feeders now leave the building overhead through the alley at the rear although provision is made so that they can be taken out underground in the future.

The Engineering Experiment Station of the University of Illinois, Urbana, Ill., maintains a number of research graduate assistanships in engineering in connection with which there is an annual stipend of $500 with freedom from all except matriculation and diploma fees. One-half the assistant's time is available for graduate study, and the assistantship must be accepted for two consecutive collegiate years at the end of which period the degree of master of science will be conferred if earned. Additional information can be secured by addressing the director of the station.

Routing a Job Through the Shop

The Denver Tramway Develops a New Plan for Making an Accurate Comparison of Costs on Shop Work

IT IS an essential to every railroad company to know accurately the cost of every repair and manufacturing job put through the shop. It is not sufficient to determine the daily cost by adding the cost of material used to the wages of the force plus a certain percentage for overhead charges. Certain methods of doing a piece of work may be so costly as to make it advisable, in the case of manufacturing small equipment, to purchase the finished article and in the case of repair jobs, either to find a new method of doing the work or to have it done outside. There is no way to determine these facts without some systematic record of every job, and incidentally this checks on the work of each man and enables the superintendent or foreman to "separate the sheep from the goats" as it were, and know what men are in line for promotion and higher pay. The Denver Tramway has developed such a systematic record in the form of a work-order route card, the first cause of its origination having been the trouble experienced in properly making charges against unauthorized work. This route card, a sample of which is here reproduced, offers protection against lost charges, gives an accurate record of the cost of any piece of work and makes it possible to compute operating expenses covering any certain period. It also gives a method for comparing costs, and for determining whether it is cheaper to buy or to manufacture a given article.



No. Pieces 302 Part B40 Spencer Cars 1/0 Car No.

Card No. 6251

Material Brass Castings Patt B40

J. N. 2502

Card written by Z Reqn. written by Z Mater. ready by W Fin. work rec'd by C

Symbol LC25

8	19	1918	8	19	1918	10	9	1918	10	12	1918

Dwg. M 11/5 It —

Op. No.	Operation Name	Dept.	Mach.	Start	Finished
1	Grind	1	C.W.	✓	✓
2	Drill	1	D.P.	✓	✓
3	Tap OK	1	13	✓	✓
	GpB				

When finished deliver to Platte 1R

2502 ROUTE CARD

DENVER TRAMWAY SHOP ROUTE CARD

When any department or person wants work done, a detailed description of the work and number of pieces wanted is sent to the mechanical department office. Here the clerk writes out the card in duplicate, filling in the number of pieces to be manufactured or repaired and, if it is some part of a car which is to be worked on, the number of the part and the number of the car are given. A complete description of the part follows and below this the clerk initials the card, giving the date. If the same clerk makes the requisitions he writes his initials under that heading, also giving the date. On the card the clerk fills in a list of the operation for completing the work, and in the upper right-hand corner he places the card number, job number, storeroom symbol under which the finished product is listed, and the drawing number, "M" distinguishing the mechanical department from the engineering department, and "It" indicating the item, as more than one item is often shown on a blueprint. Material is prepared by the stockroom, and whoever moves the card to the "material-ready" files initials that space with the date. The original card is then filed in the office.

NO WORK CAN BE DONE WITHOUT A CARD

The duplicate route card with the material is sent to the department doing the work, where it is assigned to a workman by the foreman. Before a workman can start any job he must have such a route card for that particular piece of work. When the workman is ready to start the job he takes his route card to the shop telephone and reports the route-card number, his department number and his name to the time clerk. The time clerk enters this on the time card, together with the route-card number, a description of the work and the job number, stamping the card "Start." The workman in turn fills in his duplicate with department number, his own initials, and checks the column "Start." When the workman has finished the job he again calls the time clerk, who stamps the card "Finished," and places the exact time it has taken to do the work on the time card. The workman in turn checks his card in the "Finished" column. This process follows for each operation through which the piece, or pieces of material must go to complete the work.

At the end of the day, the time cards are checked up and sent to the timekeeper in the auditing department and from these the payroll is made up. When the timekeeper has finished with the card, he forwards it to the cost clerk in the cost department, where the total costs of material and labor are entered on the job sheet.

When the finished work is turned into the storeroom the column "Fin. work rec'd. by........" is checked and the date given, and when the workman calls in "finished" the time clerk writes a move slip which is turned over to the move gang. The finished product is then moved to the destination indicated at the bottom of the route card, and the card is sent to the office where the original is filed for future reference. This card was recently described in the *Tramway Bulletin* by T. H. Zebal, chief clerk at the Broadway shops in Denver.

A recent issue of the *New York Railways Employees' Magazine* contains a very interesting report by the head nurse of that company and of the Interborough Rapid Transit Company on the practice followed in fighting the Spanish influenza epidemic in New York last fall. Great hardship was suffered throughout the city because of the lack of nurses but a number of former nurses were found among the company's female employees and they and other employees volunteered to help. During four days of the epidemic, the welfare department had 100 new cases a day among the employees, but after the organization mentioned had been effected, it was possible to handle every case. The great handicap was the inability to get outside assistance, but through volunteers this was taken care of.

Some Mysterious Car Ailments

Little but Important Troubles That Tend to Keep Equipment Men Interested in Their Work

CONTRIBUTIONS ARE INVITED FROM THE FIELD

A Car That Showed a Preference for 600 Over 1200 Volts

A CERTAIN railway property located in one of the Southwestern states received a shipment of newly equipped cars. Among them was one which gave trouble. This road used both 600 volts and 1200 volts for operating. The car referred to operated all right on 600 volts but as soon as it passed over to the 1200-volt section everything "went dead" (lights, compressor and control), although the dynamotor was running and apparently in good condition. These circuits were fed from the dynamotor through a relay which acted as an overload circuit breaker. This relay would close as the dynamotor started up but would drop out almost immediately. There was a momentary brilliancy of the car lights just before the relay dropped out which indicated a heavy rush of current with corresponding overload.

The equipment manufacturer's engineer, who was assisting in the initial operation of the equipment and following its performance, set out to solve the difficulty. There was no wiring diagram of the circuits available so all control, compressor and lighting circuits were "rung out" for grounds. This proved to be a long, tedious task and was without any beneficial result in solving the trouble. Next the connections on the dynamotor were carefully checked over and it was discovered that some of these were reversed. This mistake in connections caused the voltage for the circuits to be stepped up to 2400 instead of being stepped down to 600 as was intended. This high voltage had caused the overload which made the relay drop out.

A Peculiar Combination that Caused Erratic Operation

A MOTORMAN on a high-speed electric line employing train operation reported his train for irregular functioning. The equipment would operate smoothly for a considerable distance when suddenly the power would die out, and after a short interval the control equipment would suddenly pick up again and operate satisfactorily. He arrived at the terminal several minutes late and the train was taken out of service and turned over to an inspector for examination.

The inspector found one of the receptacles for the train-line jumpers with the cover open and the interior partly filled with snow. There had been a driving snowstorm the night previous and the receptacle cover, which was provided with a closing spring, had not closed due to rust on the hinge pin and an accumulation of ice. One of the receptacle contacts was also found to be bent so that there was barely $\frac{1}{16}$ in. clearance between the contact and the receptacle casting. As the snow melted, the water ran down the inside of the receptacle casing and caused a momentary short-circuit from the bent contact. The cover in its open position also touched the buffer iron at the end of the car and thus grounded the casing, which was ordinarily insulated by bushings. The combination of all these various elements caused a momentary grounding of the control line, which would thus drop off the power from the motors. The ground immediately cleared as the water ran away and normal operation was again restored.

To prevent a recurrence of the trouble all terminal men were instructed to make frequent inspections of receptacles during stormy weather and to be sure the covers were closed properly. A periodic oiling of the hinge pins prevented rusting. The operating department was also cautioned to use more care in inserting and removing jumpers.

How One Class of Circuit-Breaker Trouble on Multiple-Unit Equipments Was Remedied

ON ONE large system in this country, considerable trouble was experienced with the circuit breakers used with multiple-unit equipments. This control equipment was so arranged that the circuit breaker opened the motor circuit every time the controller was shut off. Due to the large motors which it was necessary to use on this equipment, the service on the circuit breakers was very severe and a great deal of trouble was experienced with the contact tips becoming loose. These tips were fastened to the stationary and movable head in the circuit breakers by means of countersunk head screws, and when the contacts would become loose severe arcing and burning resulted. It was then extremely difficult to remove the screws and fit on new contacts as the screws became welded to the bases and the heads were often burned away. In many cases contacts were blown entirely off the bases, and even those which remained in place until worn out had to be replaced every three or four months. These conditions resulted in a number of breakers being badly damaged and burned every month, and at times as many as four or five circuit breakers would be burned out in a week. These had to be entirely rebuilt.

To eliminate this trouble it was proposed that the contact tips be soldered to the fingers in addition to being held by means of the screw. The objection was immediately raised that this would make it a great deal more difficult to replace the contacts and would require additional help and facilities to carry on the extra work. The man who made the suggestion of soldering maintained that with the good contact the tips should wear for many months, and while there would be more work in renewing a tip when worn out the number to be renewed would be reduced to such an extent that no more help would be required in the long run and the number of breakers burned up would be greatly reduced. After careful consideration the plan was put into effect and its value was clearly demonstrated within a few weeks. Instead of replacing contact tips in the inspection houses every three or four months, these tips now run for an entire overhauling period, and have to be renewed only when the car comes into the main shop for overhauling. The annoyance of loose tips has been eliminated and the destruction of one of these circuit breakers is now a very rare occurrence.

Some Uncommon Causes for Blown Fuses

FUSES are the safety-valves of electrical equipment and when they blow the cause is usually sought as a short-circuit or ground in the circuits which they protect. The following cases of fuses blowing occurred on a large railway property using a third-rail contact system. The cars were equipped with multiple-unit control and were operated in trains. A bus line of No. 00 cable ran throughout the train and a 750-amp. copper ribbon fuse on each car was connected in series with the bus line.

Considerable trouble was experienced due to these fuses blowing. In several cases the leads to the fuses were blown out of their terminals. The number of such troubles was greatest during the rush hours when there was a heavy peak load. Tests made on the equipment showed everything in normal condition with no signs of grounds or short-circuits that would be expected to cause such trouble. A further investigation was made by installing an ammeter in the bus line and by taking frequent readings of current while the train was in service It was found that the bus line frequently carried current far in excess of that taken by the car equipment and greater than the capacity of the 750-amp. fuses. This excess current came from the bus line carrying part of the third-rail current due to its being connected in parallel with the third-rail. Overloads were also caused by the bus line bridging sections of third-rail which were fed from different substations.

After discovering the cause a remedy was applied in the form of a high capacity low resistance which was installed in the bus line so as to limit this current to a safe value.

Another peculiar case of fuses blowing was experienced due to these same conditions. The shoe fuses were blown on a line of fourteen cars which were out of service at the time due to a track laborer accidentally dropping a crowbar across the third-rail and running rail. The tremendous current that followed found an easy path through the car wiring in which the fuses were installed and the blowing of the fuses resulted.

A Train That Insisted on Going in the Wrong Direction

A TRAIN fully loaded with passengers was waiting at the terminal for the signal to proceed. The starting gong rang, the motorman threw his master-controller handle to the starting position and the train started, but in the opposite direction from that expected. It was moving rapidly toward the bumping block and a serious accident impended when the motorman threw off his power and gave an emergency application to the brakes. After bringing the train to a sudden stop the motorman blew his whistle for an electrician. This worthy personage came on the run and looking up at the number of the first car of the train recognized it as a "jonah." This car had been reported for several days previously as giving trouble, but nothing wrong could be found with it. The electrician first looked at the reversers on the train and found them thrown to the reverse position. Next he opened up the controller, which was of a multiple-unit type, on the head car which had previously been reported for trouble. On examining the interlocks he found one four-point interlock short-circuited by a washer at the end of the interlock contacts. This particular interlock governed the operation of the reversers and was the immediate cause of the trouble. By operating this interlock by hand the electrician found that the fingers were "stubbing." The contacts did not move to their proper position and the cylinder to which they were attached rebounded. The electrician bent the ends of the fingers slightly with a pair of pliers to overcome the immediate trouble and then allowed the train to go into service.

As a result of this and similar troubles with this type of interlock it was found necessary to redesign the contacts and fingers. The point of support for these latter was moved out so as to decrease the danger of stubbing and the length of the fingers and their shape were changed to provide easier approaches for the contacts and greater flexibility in their movement. These remedies effectually eliminated trouble of this class.

The Banner Mystery Solved by a Green Inspector

THE length of the long line of stalled cars was increasing rapidly. The passengers were beginning to show their uneasiness at the duration of the detention and employees of the railway were running around endeavoring to locate the source of the trouble. A green inspector ran up the line and found an old single-motor car at the head of the string. The motorman said he did not know what the trouble was, but the car would not start. The inspector looked underneath and seeing but one motor said: "Sure it won't run, you've dropped a motor."

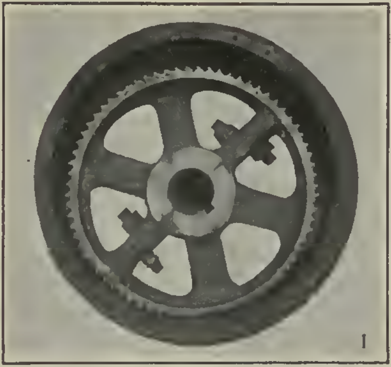
Moral: "Appearances are sometimes deceptive."

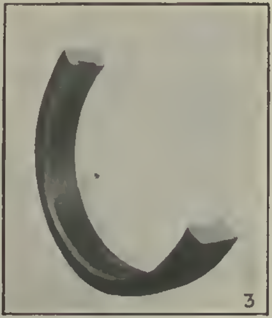
Making Emergency Gears to Keep Cars in Service

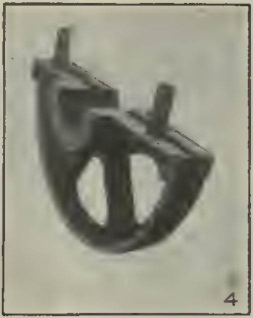
Gear Was Constructed by Shrinking a Steel Rim Made from Car Wheel Tires On Center Portion of Wornout Gears

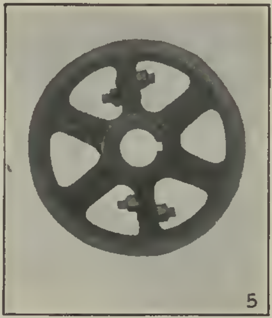
By W. C. Butler
General Manager, Pernambuco Tramway & Power Company, Ltd.

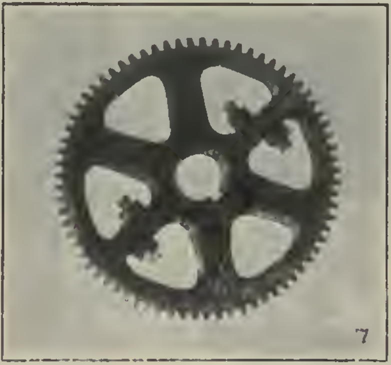
NEVER in my experience with electric traction has it been so difficult to keep the wheels turning, as during the last twelve months. This has been especially true with South American railways where the limitation placed on exportation, the present difficulty of ocean shipment, and the attendant delays, have made it exceedingly difficult to obtain any material at all. The Pernambuco Tramways have been subjected to particular hardship, as when the war broke out in 1914 they were in the early stages of construction, with only a few miles of track in actual operation, and with practically no maintenance material on hand. Some construction material had been imported before the war, and due to this we have 65 miles of track, 100 motor cars and fifty trailers in operation. There are still some 20 miles of track to be constructed and additional rolling stock is badly needed, but this must wait until conditions become more nearly normal. Due to our shortage of material while maintaining the equipment in service, we have had to resort to all sorts of schemes and ideas to help us through the emergency. Scrap heaps which have lain for years and had been considered entirely useless have been returned to life and usefulness in a way that would never have been considered a few years ago. The manufacture of home-made gears from worn-out material was one of the things to which we resorted in order to keep our cars in service. Accompanying illustrations show the various stages of manufacture and the construction that was necessary in this work.











No. 1—Worn-out gear and locomotive tire.
No. 2—Locomotive tire in lathe for turning.
No. 3—Half rim made from locomotive tire ready to shrink on center casting.
No. 4—Half center ready to receive rim.
No. 5—Completed blank ready for milling teeth.
No. 6—Gear in machine having teeth cut.
No. 7—Finished gear.

We were fortunate in having a number of scrapped locomotive tires available from a defunct steam railway, which had been eliminated by electrification. These tires, together with the worn-out gears removed from our equipment, constituted the raw material which we used. The locomotive tire was first roughed out in a wheel lathe to the approximate dimensions necessary for the new gear rim. After this rough turning the tires were cut into two pieces and reduced in the blacksmith shop to the proper radius for gear rims. After this they were turned inside to finished dimensions ready to be shrunk on the half center portion.

The old teeth were turned off from the worn-out gear and arranged with a dovetailed construction for receiving the band. In assembling the half bands were heated uniformly to a cherry red, and put into a vise, when the cold half center was slid into the dovetail and the band was allowed to shrink on. The rim thus gripped the center by means of the dovetail section in such a way as to render it impossible for it to loosen. By referring to the illustration showing a completed blank it will be seen that the ends of the band are machined off to conform to the split of the gear, which prevents the slipping around of the rim in service. A well finished stop-plate is put in these ends, as shown in the illustration. The completed blank was next taken to the milling machine where the teeth were cut. Our milling machine was not intended for such heavy work, and had to be blocked up to take the gear and several cuts had to be taken off before the finishing tool was put through to avoid straining the machine.

No attempt was made at heat treatment for fear of destroying the fit and grip of the band on the center. The old tires used were of very good quality steel and so far these gears have given excellent results with no more appreciable wear than our factory-made cast-steel gears. While home-made manufacture of gearing would not be considered under normal conditions, it was absolutely necessary with us in this case, as by this expedient we were able to keep our cars in service, which would otherwise have been laid up.

Copper-Clad Wire for Use as Span Wire

BY G. H. MCKELWAY
Engineer of Distribution, Brooklyn Rapid Transit System.

THE use of galvanized iron or steel wires for spans has for so many years been universal practice that when anyone hears span wires spoken of the thought of material other than galvanized iron or steel being used does not enter his mind. There have been good reasons for this, as the galvanized wire has, almost without exception, been satisfactory for ordinary service and so cheap that a more expensive wire, even with a longer life, would not be considered because the greater first cost could not be offset by lessened maintenance cost.

The war, however, has changed so many of our ideas that it is possible that, if present prices for material and labor continue long, it will be advisable to substitute another material for the galvanized-iron or steel wire.

The writer became interested in the use of copper-clad wire for spans several years ago when he had the opportunity to observe its use on the lines of two different companies. In both cases the wire was used at points where galvanized wire had not been entirely satisfactory owing to the severe conditions that had to be met. In one location damp, salt air was very hard on the wire while at the other the life of the wire was greatly reduced owing to corrosive fumes in the air.

Accurate information in regard to the performance of the new type of wire can be given for only one of these lines. There the wires have been up for eight years in a location where iron or steel wires would have rusted so badly as to need renewal several years ago. A recent inspection of the copper-clad wire showed it to be in perfect condition and with no signs of rusting.

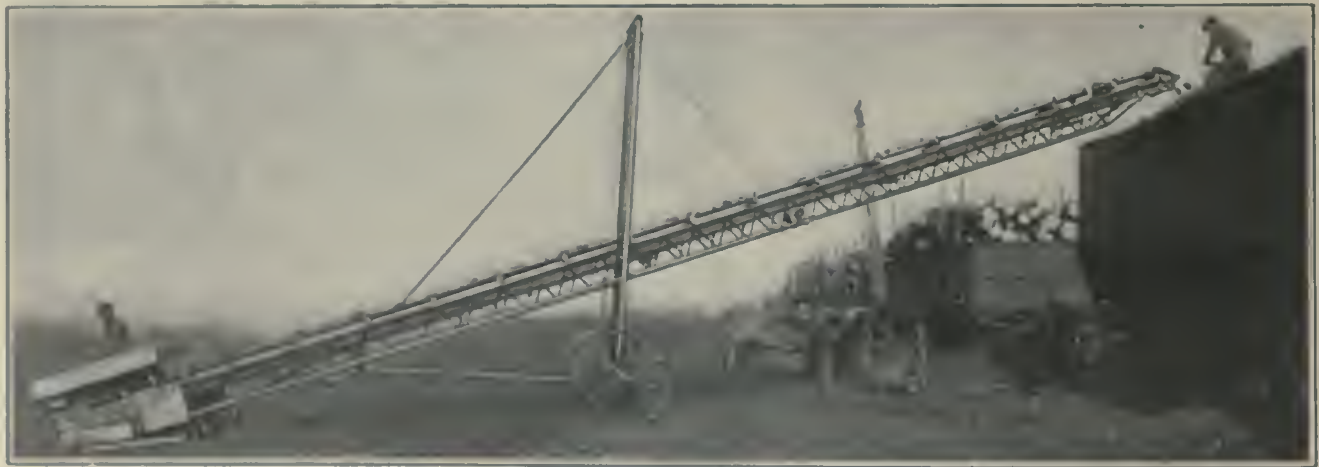
While the ultimate life of the wire cannot be determined from an eight-year test it seems certain that the life will be more than twice that of galvanized wire under the same conditions.

At the time that these installations were made the writer did some figuring on their cost as compared with ordinary span wire, and came to the conclusion that a more extensive use of the copper-clad wire could not be justified except where abnormal conditions existed. Since then, while prices of both kinds of wire have gone up to record figures, a much greater increase has occurred in the labor cost of installing the spans, so that recent figures would appear to justify the use of the copper-clad wire. As conditions and the prices of both labor and material vary so much in different sections of the country, it would be best for each engineer to make sure for himself as to whether or not the installation of the new wire would pay. But it would be well to look into the matter, as the writer is convinced that in many places considerable money could be saved by the adoption of the higher-priced wire.

In conclusion it should be said that the manufacture of the wire referred to in this article is not confined to any one company, as it is produced by at least two manufacturers. The suggestion as to its possible field of usefulness is made only for the reason that it may help someone else to learn of a way to save money.

Portable Belt Conveyor Used for Coal Unloading

IN AN ARTICLE on equipment of the Harvard Avenue yard of the Cleveland Railway, printed in a recent issue of the ELECTRIC RAILWAY JOURNAL, mention was made of a portable belt conveyor which is used there for various loading and unloading operations. In this connection a similar equipment, made by the Barber-Greene Company, Aurora, Ill., and used by the Western United Gas & Electric Company for coal unloading, etc., will be of interest. This equipment is shown in the accompanying halftone and is in use at the Joliet, Ill., plant of this company. The statement is made that with the outfit the company is able to load a car with coke in from two to four hours depending upon the type and size of the car, where formerly it was impossible to load a car in less than from seven to ten hours. At the same time the cost of loading per ton has been reduced approximately 50 per cent.



PORTABLE CONVEYOR IN USE FOR LOADING COKE; ALSO USED FOR UNLOADING COKE AND FOR UNLOADING AND RELOADING COAL

This particular conveyor utilizes a boom 18 in. square and 51 ft. long and is operated by a 5-hp. electric motor. As shown in the illustration the conveyor is loading cars from the coke stock pile. A more frequent use for the same conveyor is the reverse of this process, in receiving coal direct from the car hoppers and discharging it at the storage pile.

LETTERS TO THE EDITORS

Dr. Wilcox on New York City Situation

NEW YORK CITY, Feb. 11, 1919.

To the Editors:

In the issue of the ELECTRIC RAILWAY JOURNAL for Feb. 8 a statement appears with respect to the action taken by the City Club of New York in the matter of the local transit problem. A synopsis is given of what purports to be a protest by the committee on public service of the City Club embodied in a letter sent to Mayor Hylan and to the Board of Estimate and Apportionment. My name is mentioned as one of the members of the committee. In order that there may be no misunderstanding of my position in the matter, I wish to make the following explanation. The questions of public policy involved in the application of the local transit companies for increased fares were referred by the board of trustees of the City Club to the committee on public service for a report. After a good deal of deliberation the committee submitted a report which was then modified by the board of trustees in certain important respects and embodied in a letter from the president of the club to the Mayor. Upon two important points covered by the summary published in your JOURNAL, my views are at variance with the recommendations of the City Club.

1. It is pointed out that "municipal ownership does not mean municipal operation." Personally I believe that the logical result of municipal ownership is municipal operation. The difficulties of effective public control over a private operator using public property are in some respects even greater than the difficulties of control where the private operator is using his own property for public service. In advocating municipal operation I do not mean that the utilities should be thrown to the political wolves, but that some special form of administration must be worked out that will be directly responsive to the will of the community which it serves. My philosophy of municipal ownership and operation is not the philosophy of the last resort. I believe that urban transit is a public function and that if we are not ready to attend to our own business it is time for us to get ready; that our efforts should be not to postpone the inevitable as long as possible but rather diligently to set about the necessary preparation for doing what has already been too long postponed.

2. The City Club recommends, among other things, "the necessary legal steps to enable the city to issue income bonds as a first lien against the net revenue of the lines which it may acquire." The committee's report was to the effect that these income bonds should be a first lien against the *gross* revenue. It was the committee's opinion, in which I shared, that a security based upon net revenue would be wholly insufficient to provide a market for municipal transit bonds. This is obviously true in the case of a city which adopts the fundamental policy of the New York subway contracts, by which a low fare is guaranteed on account of the social and civic benefits believed to be involved in cheap transportation at uniform rates. The use of public utility certificates secured by a first lien on the gross revenues of the utility, is, I believe, an invention of the State of Washington. Everything possible should be done to give security to the bonds issued for the purpose in order that the necessary cost of capital may be kept down to a minimum. One of the stock arguments in favor of municipal ownership has been the superior credit of the cities as compared with private companies, and now that the problem of financing the street railway business upon any terms has become most acute, it is this possibility of utilizing public credit where private credit has failed that is driving many men who were formerly staunch advocates of private ownership into the municipal ownership camp. To make municipal utility bonds dependent upon the net earnings of the utility would be to give them even less security than the bonds of conservatively financed public service corporations now have, for under this scheme the entire cost of the property would be represented by municipal utility bonds, whereas under conservative private management the bonds outstanding represent only a percentage of the total investment. For these reasons, I believe that municipal bonds issued to provide funds for the acquisition or construction of public utilities should either be a lien against the general credit of the city on a par with all other bonds or else should be a first lien against the gross earnings of the particular utility, leaving the deficits, if any should occur, to be made up from taxes.

DELOS F. WILCOX.

Bangor Chamber Urges Study of Utility Question

BANGOR CHAMBER OF COMMERCE

BANGOR, ME., Feb. 8, 1919.

To the Editors:

The following is a copy of resolutions adopted by our organization.

RESOLUTIONS ADOPTED BY THE BANGOR CHAMBER OF COMMERCE

Whereas, the Bangor Chamber of Commerce feels that the country is facing a grave situation in regard to public utilities,

And, Whereas, they feel that all citizens are vitally interested in the wellbeing of the public utilities,

And, Whereas, they feel that on their organization and on similar organizations throughout this entire country rests a grave responsibility in this regard,

Now, therefore, Be it resolved:

That the Bangor Chamber of Commerce, realizing that their duty is to study the question both in the State of Maine and elsewhere, desires to make known to their members and to the citizens of this community the result of their study.

That as a result of such study the Bangor Chamber of Commerce finds that a substantial part of the funds of the savings banks is invested in bonds of public utilities; that the depositors of Mutual Savings Banks are in reality part owners of every such investment. That the same is true of the life insurance companies both as to investment and ownership. That the present and future wellbeing of every community is directly dependent upon the successful running and further development of the public utilities operating in their locality. That every such community should be anxious to see that the conditions under which such public utilities are operating are such as to allow the companies sufficient revenue to properly protect the public from accidents, to keep their lines in good condition, to render efficient service to the public, to make further needed developments, and to safeguard the property ownership of the investing public.

The Bangor Chamber of Commerce feels that a much graver responsibility rests with the Public Service Commissions; that their sworn duty is to see that the public utilities are properly and efficiently run; that they are responsible for the credit, continuity and general wellbeing of the public utilities. That every public service commission should be upheld and backed where they have recognized such responsibility. That where commissions have not so recognized this duty the public should insist that they do so.

The Bangor Chamber of Commerce urges every board of trade in the State of Maine to start at once a study of this question, to urge the National Chamber of Commerce at Washington to give space in *The Nation's Business* to this question, to ask the National Chamber of Commerce to urge every member of the National Association to study this question and to make known through publicity in the same channels the result of this study.

The Bangor Chamber of Commerce also urges the Bangor Rotary Club to take this up with their National Association in the same manner. The Bangor Chamber of Commerce feels that an intelligent study of this question by the business men of the country, with a campaign of publicity as to the result of this study, will aid greatly in solving rightly this very grave problem.

Our principal desire is to aid in getting people generally to study this question. We are sending copies of this resolution to similar organizations throughout the United States. The Bangor Rotary Club is sending them to all Rotary Clubs throughout the States. We have also taken this up with the United Commercial Travelers. JAMES Q. GULNAC, President.

AMERICAN ASSOCIATION NEWS

Speakers for Mid-Year Meeting

AT THE DINNER to be held in connection with the mid-year meeting of the American Association in New York City on March 14 the speakers will be Hon Warren G. Harding, United States Senator from Ohio; Hon. Lindley M. Garrison, former Secretary of War, and now receiver of the Brooklyn Rapid Transit System, and B. A. Hegeman, Jr., representing the manufacturer members of the association. J. H. Pardee, president of the association, will preside. The dinner will be held at the Waldorf-Astoria at 7 p.m., preceded by a half-hour reception.

Progress is being made on the list of speakers for the technical sessions, who will cover the topics given in the outline program on page 215 of the issue of this paper for Feb. 1.

Lieut. Frank Roszel Speaks at Newark

AN ENTHUSIASTIC "get-together" meeting of the Public Service company section was held in Newark, N. J., on Feb. 14. The speaker was Lieut. Frank Roszel, an employee of the Public Service Railway, who had just returned from the western front in France. The lieutenant was range-finder for a big gun, having served in an advanced position with the heavy artillery. The meeting was enlivened with music, and refreshments were served.

Panama Canal Construction Reviewed

THE Rhode Island Company section held a meeting on Feb. 3 in its new gathering place, the Pythian Temple. The feature was a "movie" film showing the building of the Panama Canal. The remainder of the program was of an entertainment character, principally instrumental and vocal music.

Transportation and Energy Transmission Are Intimately Related

Inclusion of Power Lines Among Common Carriers Is Recommended by the Smithsonian Institute as an Economic Necessity

THE Smithsonian Institute of the United States National Museum is issuing a series of bulletins prepared by the division of mineral technology. Several relate to fuel and the power situation, and one shows how the problems of transportation are tied in with those of electric power transmission. Among the conclusions reached the following are significant.

Transportation difficulties are threatening to throttle the economic life of the country. If unrelieved the situation will entail a deterioration in the standard of living. The issue cannot be adequately met by furthering the development of the railways alone, but the logical way to correct the transportation unfitness of this country is to attack the matter through improvement in power usage. The three principles of transportation which underlie industrial growth are (1) the employment of suitable facilities for transportation, (2) the advance elimination of superfluous weight, and (3) the full utilization of the material transported. National experience has shown (1) that a transportation system of countrywide scope serving a comunity interest must be of a common-carrier order subject to public regulation; such has been the lesson of the railways; (2) that in the realm of production, which has to do with the advance elimination of superfluous weight, competition is desirable and should be as unhampered as possible; (3) that in the field of manufacture and consumption the attainment of full utilization stands in need of constructive help.

Applying these conceptions to power we find that the situation is at fault, because (1) there is no common-carrier system for the transmission of energy, although the development of electricity permits the power materials to be freed of weight at the source and enables the energy of water power to be utilized; (2) the presence of the railways, in the absence of special facilities for electric transmission, has prevented competition from becoming effective in the direction of the advance elimination of weight; and (3) the failure of this country to recognize the principle of multiple production and vitalize its latent force has held private initiative impotent to use fully the energy materials provided.

The provision of a common-carrier system of transmission lines, in brief, is the key to the whole problem. Its establishment will remove the retarding influence of high interest rates and antagonistic misunderstanding that has blocked water-power development, and will afford the point of departure from precedent in favor of coal-field generation of electricity.

Specific action in respect to establishing a common-carrier system adapted to the power needs of the country will not only go far toward solving the problem of transportation, but it will improve the fuel supply, correct the economic fallacy of drawing upon capital resources while neglectful of income, contribute to the recovery of the values now lost in the consumption of raw coal, and constitute a potent contribution in the stimulation of a constructive economic policy.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Seattle Lines Stopped

General Strike Results in Complete Suspension of Privately Operated City Lines

The sympathetic strike on Feb. 6 of approximately 130 unions in Seattle, following the walk-out of 25,500 shipyard workers on Jan. 21, involved more than 60,000 union employees and tied up the city's industries.

The electric railway system of the city was completely paralyzed, with the exception of the two lines of the municipal railway. The trainmen of the Puget Sound Traction, Light & Power Company voted unanimously to join in the general strike, and no cars were operated from Feb. 5 until Feb. 10.

Following the announcement of Mayor Ole Hanson that every city employee was regarded as a civil service employee, and that if such workers joined in the general strike their positions would be filled by others, and would not be open to them upon the cessation of the strike the trainmen of the municipal lines reconsidered their decision to strike and remained at work. The trainmen are affiliated with the local trainmen's union, and the union would not grant them exemption. A. L. Murphine, Superintendent of Public Utilities, and Mayor Hanson had announced that if the trainmen walked out the municipal cars would be operated with outside help, but that they would be kept going.

The interurban lines of the Puget Sound Traction, Light & Power Company did not cease operation. A statement made by the Pacific Northwest Traction Company and the Puget Sound Electric Railway, the former operating interurban lines between Seattle and Everett, and the latter between Seattle and Tacoma, Seattle and Renton, Tacoma and Puyallup, was as follows:

> This company operates interurban cars between Puget Sound points. The trainmen are members of steam road organizations, Order of Railway Conductors, Brotherhood of Locomotive Engineers, and Brotherhood of Railway Trainmen. The operation of our cars is analogous to the steam roads, and as long as the steam roads operate, we anticipate no cessation of our operation.

The city jitney men also voted to join the general strike. In consequence the Seattle public from the morning of Feb. 5 until railway service was restored were dependent solely upon private automobiles for transportation, with the exception of the Lake Burien and Ballard districts served by the municipal lines.

The strike was exceptionally orderly, with complete arrangements by the union officials to feed the public, and precautions taken in the way of police co-operation.

The sympathetic strike was ended Feb. 11 by official order of the general strike committee. The end of the general strike was virtually assured on Feb. 9 when trainmen of the Puget Sound Traction Light & Power Company, Seattle & Rainier Valley Railway and Municipal lines returned to work.

An ineffectual attempt was made on Feb. 10 by the general strike committee to have the trainmen walk out a second time and return to their jobs on Feb. 11 with the remainder of striking unions. The trainmen were influenced in refusing by notice served by the traction company officials and city authorities, who stated that trainmen striking a second time would be dropped from the payroll permanently.

The street railway operators violated the agreement with the traction company by striking, as they had agreed to arbitrate all disagreements, remaining on the job in the meantime. Railway service in Tacoma has also been resumed.

Service on the Municipal lines was interrupted for only twenty-four hours. Service on the traction company lines was at a standstill from the morning of Feb. 6 until the afternoon of Feb. 8, when company officials operated cars on several important lines from 3 o'clock until midnight. Service was restored to normal on all lines on Feb. 9. It is generally admitted that the return of electric railway trainmen was the most important factor in breaking the general strike.

Texas Bill Reported Favorably

Passage of the public utilities bill, now pending before the House and Senate of the Texas Legislature, is indicated by favorable committee reports on the measure. The bill, introduced by Senator Dorough of Texarkana, proposes to place electric interurban lines, city railways, electric light systems, and other public utilities under supervision of the Texas Railroad Commission, with the exception of those utilities owned by municipalities and companies having the so-called service-at-cost franchises. The local lines in Dallas would not be included, as the company operates under a service-at-cost franchise. The right to fix rates, service rules and regulations and practices is delegated to the Railroad Commission. An appeal may be taken from the ruling of the Railroad Commission to the District Court of Travis County. Such appeal may be taken by either the city or the utility affected by such decision. City authorities are opposing the bill on the ground that it will interfere with the rights of cities.

For Unified Power Supply

Secretary Lane Recommends Investigation for District between Boston and Washington—Of Use to Railways

Secretary Lane of the Interior Department has sent to Congress requests for two appropriations for special investigations and reports on the power supply. One of these is a request for an appropriation of $50,000 for a survey of the power resources all over the United States. The other is for an appropriation of $200,000 for a report on the power supply for the industrial region of the northern Atlantic seaboard, extending in general from Boston to Washington. The latter has been approved by the Secretary of the Treasury and has been forwarded to Swagar Sherley, chairman of the House committee on appropriations. The power capacity in this territory now aggregates for central stations and railway plants about 4,000,000 hp. and for industrial plants about 4,500,000 hp. In a letter to Mr. Sherley explaining the necessity for this appropriation, Secretary Lane says, in part:

> I believe the investigation will form the basis for a constructive national policy of the highest economic and industrial significance. In a few months, and especially in the regions mentioned, I anticipate a greatly increased demand for energy, for which present facilities are inadequate. If the country is to reap the full benefit of this returning wave of activity it must be prepared to furnish industry and transportation with an adequate, dependable and economical power supply.
>
> This result will be accomplished through the interconnection of existing power centers by means of a trunk-line transmission system of high efficiency. Into this trunk line energy will be fed from hydroelectric plants and steam power stations located at tidewater and near the coal mines. From it will be taken the power required for each principal industrial center and for the electrification of trunk-line railroads and of such branch lines as may be located in metropolitan districts.
>
> Such a comprehensive system of power supply, making use as it would of unutilized or undeveloped water power and of fuel now wasted at the mines, will result in large savings in coal. A very large amount of coal now consumed by steam power plants can be replaced by the development of water power. Fuel power can be developed near the mines and the wasteful transportation of coal by railroad to that extent avoided. I am reliably informed that as a conservative estimate 50 per cent of the fuel now used by the railroads in this territory can be saved through the operation of trains by electricity instead of by steam locomotives, because of the much higher efficiency that can be obtained in the economical central station in comparison with the wasteful steam locomotive.
>
> The transmission of this energy as electricity instead of the hauling of coal by rail will relieve the railroads of this territory of an enormous freight burden, thereby making available transportation for the hauling of other commodities. This is a matter of far-reaching importance. Not only would the railroads in the immediate territory be relieved of hauling the coal for their own locomotives but other railroads supplying them with coal would be relieved proportionately. This easing of the present strain on trackage and equipment would result automatically in an increase in transportation facilities, the necessity for which the country is now facing.

Developing Latent Talent

Suggestion Made that Government Use Its Machine-Tool Equipment for Industrial Training

If the bill introduced by Representatvie Charles Pope Caldwell, New York, on Feb. 4 becomes a law, every high school in the United States may be equipped with a first-class machine shop for industrial training. The machines with which to equip these schools are now in the possession of the War Department, and Mr. Caldwell proposes that "the Secretary of War shall lend them to trade and technical schools, universities and other recognized educational institutions, which in the discretion of the Secretary of War should have such equipment." It is provided, however, that each institution so equipped shall be responsible to the government "for the proper care and safe return of such equipment when demanded, ordinary wear and tear excepted." The plan has the indorsement of the *American Machinist*, the leading machine tool paper.

There is estimated to be between $200,000,000 or $300,000,000 worth of government-owned machine tools, bought on account of the war, of which amount perhaps one-third may be absorbed by existing arsenals. The remainder, according to the terms of the appropriation bill under which they were bought, must be sold to bring the greatest possible returns to the government. There is no ready market for these tools at the present time, machine shops throughout the country being overstocked on account of their expansion during the war. Therefore, the sale of these tools unless made at a considerable loss will be strung over a number of years which will have the effect of demoralizing the machine-building industry and also entailing the storage of these tools at the government expense, and storage charges on this class of machinery approximate 20 cents per square foot per annum.

One of the leading legislators has said of this proposal: "The government can well afford to give this machinery outright to schools that will put it in good use, as it then would go back to the use of the people who have paid for it in the first place."

Fair Play for the Home Buyer

In connection with the recent strike of the employees of the Kansas City (Mo.) Railways there is a feature which the public does not generally understand, although many of the employees do. In the interests of its workers the company some years ago organized a building association which purchased comfortable homes for the men and allowed easy payments without interest. There were originally about 800 in the association and all but about 300 have paid up and have their homes free. None of the latter, who are among those who "ceased work," have been dropped from the list. Their homes are secure if they keep up their payments, even if they never return to the railway.

Another feature is the pension system. Any worker who has been with the company a few years and is obliged through disability to retire, receives a pension, small, of course, if he has been employed a short time. The minimum, however, is $240. If he remains twenty years he receives 40 per cent of his wages; if twenty-five years, 50 per cent; and if thirty he receives $750 to $800 a year.

"Co-operate!" Says Public Trustee

Earle P. Carlton, a trustee of the Eastern Massachusetts Street Railway, which will succeed the Bay State Street Railway, Boston, Mass., in a statement relative to the electric railway situation lays stress upon the necessity of the public aiding the work of rehabilitation by the trustees. He said in part:

> The trustees may be depended upon to do their best for the railway and the public. Whatever they decide to do, the public should understand will be done because the trustees fully believe it needs to be done. The public should accept the fact that the trustees will act for their best interests. It should support them. If fares are increased it will be because the trustees find it necessary to secure money absolutely required for operating and maintaining the service. If fares are raised, they will be reduced again as soon as returns from the traffic make it possible. The public is going to get the best treatment that is possible and it can help by not knocking.
>
> The present condition of railway service in the State is undoubtedly due in part to mismanagement. State control has been proposed as a remedy, but State control would mean increased cost, whether or not it brought the remedy needed. Corporation management is preferable and corporation management under trustees such as has been decided upon should bring about the improvement needed.

Random English Notes

The London County Council is in a state of virtuous indignation against the Ministry of Munitions because the latter has subsidized a privately owned service of ombnibuses in the southeast of London. The subsidy was temporary in order to increase facilities for workmen in Woolwich Arsenal getting to and from their work. The war being over, the subsidy has ceased, but the bitterness of it was that some of the subsidized ominbuses ran over tramway routes.

G. W. Halford, general manager of Salford Municipal Tramways, has been appointed Honorary Secretary of the Municipal Tramways Association, in succession to Mr. Clough, who has left the tramway industry to become manager of a paper-making business. The extremity of the transition from one industry to another of a leader like Mr. Clough in his field of effort is more characteristic of the United States than of England.

The question of nationalization of British railways is still being agitated, W. Churchill, Minister of Munitions, having indicated that the late government is in favor of that course.

Minneapolis Draft Presented

Proposed Franchise Provisions Will Be Considered in Weekly Meetings

An outline draft of the service-at-cost franchise for the Minneapolis (Minn.) Street Railway has been submitted to the committee of the City Council on street railway matters by City Attorney C. D. Gould and Stiles P. Jones, who were retained by the city as franchise experts. The basis of the proposal is service at cost, starting with a 5-cent fare with universal transfers plus a division of earnings between the city and the company and complete city supervision over service and extensions.

The proposed franchise provisions will be considered by the committee in a series of weekly meetings. At its last meeting the committee decided to take the C. L. Pillsbury valuation of $24,346,113 on the company's property, and allow the company 7 per cent earnings on that valuation, instead of on the $25,914,307 figure fixed by City Engineer F. W. Cappelen.

The fundamental purposes of the franchise grant, as stated by Messrs. Gould and Jones, are as follows:

> To furnish the Minneapolis public with adequate railway service at all times, at a rate of fare sufficient to provide the facilities for such service, meet the legitimate costs of operation, maintain the property continuously in first-class condition and pay the company its fixed minimum return upon investment.
>
> To provide for effective public control of service and extensions.
>
> To provide for such public supervision of the property as will assure honest, efficient and economical management in the public interests.
>
> To provide for an equitable division of the surplus earnings between the city and the company.
>
> To provide for the purchase of the property by the city, and the terms, times and conditions thereof.

Important provisions of the grant as proposed are as follows:

> The company shall surrender its present franchise and waive all rights thereunder upon the taking effect of this ordinance.
>
> The city shall have the right to purchase upon agreed valuation and subsequent additions giving one year's notice of its intention to purchase, at expiration of any five-year period.
>
> The fare shall be 5 cents, with universal transfers; children under six years of age, free. Policemen and firemen may ride at reduced rates, as provided by the State law
>
> The company may adopt reasonable regulations governing the use of transfers, subject to the approval of the City Council.

Safety Device Inquiry Put Off

Officials of the Brooklyn (N. Y.) Rapid Transit System who are under indictment on account of the Malbone Street accident have declined to take the stand in the investigation undertaken by the Public Service Commission for the First District involving the proposed installation of safety devices on elevated and subway lines of the system. Until the criminal proceedings in which they are involved have been concluded these officials decline to appear as witnesses in any proceeding of this sort. The company has asked for a delay in the proceedings, and the commission adjourned the hearing to consider the company's application.

Government Placing Men

For the first time in the history of America's development, employers have an opportunity of selecting from a large and varied list of highly educated and experienced men those individuals especially equipped to meet their particular requirements. Engineers, executives, men of college training and practical experience in business and technical fields are now being released from the Army, Navy and war work. The professional and special section of the United States Employment Service, a branch of the Department of Labor, has been organized for the benefit of employers in need of these men. The service is entirely free of charge. I. W. Litchfield, the head of the professional and special section, was one of the organizers and directors of the United States Public Service Reserve which supplied high-grade engineers and business men to the government for war work.

The United States Employment Service is now divided into two great zones for the purposes of the professional and special section. The New York office, headquarters for the Eastern zone, at 16 East Forty-second Street, is in charge of the following states: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Ohio, Maryland, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida and Alabama. The Chicago office, headquarters for the Central zone, at 63 East Adams Street, is in charge of all remaining states. Later zone offices will be established to take charge of part of the territory now in the Chicago zone. The employment service is also represented in each of the forty-eight states by the federal director for that state. The United Engineering Societies, composed of the four great engineering organizations, are co-operating with the professional and special section in placing men in the engineering professions.

The types of men and women registered in the professional and special section are indicated by the following partial list: statistical workers, stenographers, accountants, advertising and publicity workers, auditors, bankers and brokers, cost experts, draftsmen, electrical engineers, executives, librarians, mechanical engineers, purchasing agents, real estate and insurance workers, safety engineers, social workers, traffic managers and inexperienced college graduates.

Ottawa States Its Position

The city of Ottawa is buzzing with talk of the offer of sale made by the Ottawa Electric Railway, referred to briefly in the ELECTRIC RAILWAY JOURNAL for Feb. 8, page 298. So that there may be no misunderstandings Mayor Fisher has made this statement:

> Toward the end of last year some negotiations were entered into in connection with the purchase of the railway. The railway expressed a willingness to fix a price and the board of control intimated that they were willing to have an offer from the company. Beyond this no further progress was made.
>
> We now have an offer from the company which means that we are to pay for the assets of the Ottawa Electric Railway, the par value of the shares of the Ottawa Traction Company—that is, according to the letter received—$5,630,700. We also are to assume the outstanding obligations. I understand we are to assume that there are outstanding $400,000 of 4 per cent bonds. There is also a fluctuating liability to the bank, amounting now, as per the statement of the Ottawa Electric Railway, to $370,000.
>
> The board has no opinion to express as to the price. As a matter of fact, there is no one outside of the officials of the company who is in a position at present to say what the value of the road is. I think it would be well if we all abstained from expressing any views on this subject until we have full information.
>
> A special meeting of Council will be held in order that authority may be given to the board to obtain the necessary advice. When we have a report from the persons employed, it will be for the Council to say whether the offer of the railway is at such a figure that it should be submitted to the people. If they think the price at which the railway is offered is reasonable, then a vote must be taken.
>
> In the meantime it may be necessary to go on with legislation so that it may be available if action is taken later.
>
> The company was asked for a price by Dec. 13, but a definite offer was not received by the representatives of the city government till Jan. 29.

Examiners Interpret Chicago Award

The questions arising from a dispute over the meaning of the terms of the wage award in the case of the Chicago (Ill.) Surface Lines which were submitted by the officers of Division 241 of the Amalgamated Association to the examiners of the National War Labor Board for decision, have been decided by Arthur Sturges and M. Joseph Chiesa, examiners for the board, who found as follows:

> 1. The receivers are to get an increase of 23.07 per cent over the hourly or monthly rates in effect at the time of the submission of the case.
> 2. Men operating night cars are to receive an increase of 23.07 per cent over the rate of $3.25 a day of eight hours or less fixed by the contract between the company and the association.
> 3. The day and night foremen of car repairers are to receive an increase of 23.07 per cent above their rates in effect at the time of the submission of the case for adjustment.
> 4. The tunnel and bridgemen are to receive an increase of 23.07 per cent above their rates in effect at the time of the submission of the case, and if this does not bring any adult male employee in this classification up to the minimum rate of 42 cents an hour, he is to receive said minimum of 42 cents an hour for the actual number of hours worked up to ten hours a day.
> 5. Employees who are incapacitated from doing a normal day's work by reason of age or physical disability may be paid a special rate, less than is granted by the award, by agreement between the representatives of the company and of the association. In case the parties are unable to agree, any specific case may be referred to the examiners of the National War Labor Board for a decision, which decision is subject to appeal to the arbitrators as provided in the award.
> 6. About half of the flagmen and crossing tenders employed by the company at steam railroad crossings are under the jurisdiction of the United States Railroad Administration. The arbitrators did not intend to interfere with the wages of these men and therefore all the flagmen and crossing tenders employed by the company at railroad crossings should be paid in accordance with the rates prescribed by the aforesaid United States Railroad Administration, beginning as of Aug. 1, 1918.

The original award in this case was handed down some months ago.

Merchants for Private Control

The Merchants' Association of New York has reaffirmed its position in opposition to government ownership and operation of public utilities and has declared emphatically in favor of private ownership under government regulation. This declaration was made in accordance with the recommendation of a special committee appointed by President William Fellowes Morgan in pursuance of action taken by the board of directors for a re-examination of the question of government ownership and operation in view of the prominence that the matter has assumed since the beginning of the war. The special committee consisted of Frank R. Chambers, chairman; James G. White, Otto H. Kahn, Frank H. Sisson, H. H. Porter and Prof. Joseph French Johnson. The gist of the findings of the committee is contained in the following extracts from the report:

> While we are not unmindful of the defects that not infrequently characterize the operation of corporations of public utilities, we do not believe that these defects can be cured by substituting another method which in every respect of efficiency is much below the standards that generally prevail under private management. In so far as the evils which are popularly assumed to exist in private management are found to exist in fact, other remedies than the substitution of methods abounding in greater evils should be found.
>
> We believe that the public can best be served by utilizing the efficiency, enterprise and energy of private corporations for the continued operation of public utilities, under such public control as shall protect the public in its right to efficient service and fair rates; and at the same time assure to private capital invested in public utilities a fair return upon such capital.
>
> We do not find any change of conditions resulting from the war which warrant or require the previous position of the association, in opposition to government ownership and operation, to be modified.

On Feb. 5 the Merchants' Association adopted resolutions favoring the return of the railroads and the telegraph and telephone systems to private control and operation under such conditions as will render them as serviceable to the public as when the government took possession of them.

Must Carry Out Improvement Program

The City Commissioners of Dallas, Tex., have granted to the Dallas Railway an extension of nine months in which to carry out the provisions of the franchise involving the expenditure of $1,200,000 in improvements and betterments.

The company asked an extension of twelve months, but Mayor Lawther and the members of the commission held that a year's extension was not necessary and that the company should be required to carry out its agreement at an earlier date in order to provide employment for many discharged soldiers.

Under the original agreement, as embodied in the franchise, the Dallas Railways agreed to expend $1,000,000 in improvements by April 1, 1919. In consideration for the extension asked, the company made a voluntary commitment and agreed to spend $200,000 more in improvements, making the total amount $1,200,000. Under the agreement embodied in the extension granted, this amount must be spent during 1919. The company will make a new bond to insure the carrying out of this agreement.

The improvements called for include extensions of several lines, two new lines, laying of heavier steel in connection with paving on several streets and betterments in the service in various respects. The new lines will be the Oakland Cemetery line and the Oak Lawn and City Hospital extensions.

News Notes

Boston & Worcester Award Announced.—Trainmen employed by the Boston & Worcester Street Railway, Boston, Mass., have been awarded a base pay rate of 42 cents an hour by the War Labor Board. The pay was fixed at 44 cents at the end of three months in service and 47 cents after one year. Employees other than carmen were awarded a minimum of 42½ cents an hour.

Bloomington Wages Must Stand.—The War Labor Board has dismissed without prejudice the complaint of the employees of the Bloomington & Normal Railway & Light Company, Bloomington, Ill., who asked an increase in the wages now paid the men under a contract between their union and the company. As the wages are definitely fixed by the contract for its full term the board could not make a change over the objection of the company.

Forty-two Cent Maximum in St. Joseph.—The War Labor Board, in the case of the St. Joseph Railway, Light Heat & Power Company, St. Joseph, Mo., has fixed the wages of motormen and conductors at 38 cents an hour for the first three months of service, 40 cents an hour for the next nine months and 42 cents thereafter. Existing working conditions and differentials paid for special services will be continued. The award is retroactive to Nov. 27, 1918.

Viaduct Agreement.—The contract between Kansas City, Mo., Kansas City, Kan., and the Kansas City Railways for the use of the inter-city viaduct awaits the signatures of officials of the city and officers of the company. Under the terms of the contract the agreement is effective until December. 1922, the time of the expiration of the franchise on the Kansas side, providing the city in the meantime acquires the inter-city structure by January, 1920. If the city has not acquired the viaduct by that time the contract ends. The Kansas City Railways is said to be ready to begin operating cars over the viaduct.

Unemployment on Increase.—The seriousness of the unemployment situation is again emphasized in figures made public on Feb. 8 by the United States Employment Service, based on official reports from its agents throughout the country on conditions of employment and unemployment. Figures based on the last information available show a much heavier increase in the area of unemployment than that shown in the reports for the previous weeks. The reports for last week showed the total unemployment amounted to nearly 265,000. During the current week this number has increased to 290,831. The total labor shortages reported amount to only 8000.

Mr. Allison Retained by International Railway.—James E. Allison, Jr., St. Louis, Mo., has been selected by the International Railway, Buffalo, N. Y., as its representative on the board of arbitration which will pass upon matters of finance in dispute between the city and the company as a step in the series of negotiations to bring the International Railway under the control of the municipal authorities similar to the plan in operation in Cleveland. The city's member of the board has not been designated by the City Council, but will probably be Harry D. Sanders, a former member of the staff of the city law department. Mr. Allison is an appraisal engineer. He was formerly on the Public Service Commission of Missouri.

Seven-Cent Wage Increase in Louisville.—Wages of men on city lines of the Louisville (Ky.) Railway are to be increased under an award of the War Labor Board to 41 cents an hour for men three months in the service; 43 cents for men six months employed, and 45 cents for men employed nine months. For the men on country lines wages are to be increased to 42, 44 and 46 cents an hour for those in service three, six and nine months, respectively. The board also recommended granting to the railway the right to increase fares. Increases in wages are to be effective and retroactive as of Aug. 12, 1918, and are to continue until the end of the war is formally declared by executive proclamation. The company has until July 17, 1919, to meet the back pay due under the award. The raise amounts to a straight increase of 7 cents an hour.

Looking for a Way Out.—Railway matters are again the center of interest in Norfolk, Va. This has come about through the recent reported willingness of those who control the Virginia Railway & Power Company to sell to the city and the more recent prospects for a renewal of the franchise negotiations. Officers of the company and city officials met recently in the City Manager's office to discuss the terms of the new franchise. Those in the conference were the City Manager, E. Randolph Williams, general counsel for the Virginia Railway & Power Company; W. H. Venable, local counsel for the company; I. Walke Truxtun, City Attorney R. W. Peatross, George Pilcher, former city attorney; H. H. Rumble and C. B. Buchanan, vice-president of the company. Mr. Williams stated that he saw no reason why the franchise could not be framed to the satisfaction of both parties to it.

Board of Estimate Relents.—The Public Service Commission for the First District of New York has received from the Board of Estimate & Apportionment an additional appropriation sufficient to enable it to re-employ practically all of the engineers on subway construction work who were laid off by the failure of the Board of Estimate & Apportionment to appropriate a sufficient sum for their salaries and expenses for the year 1919. It is now expected that much of the new subway work in process of construction which it was believed would have to be held up can be advanced. Plans are being made by the commission for the letting of several new contracts in the near future. However, the delay which has been occasioned by the practical cessation of work because of lack of supervision through January may be serious enough to carry over into 1920 the completion and beginning of operation of certain of the new lines which it was believed would be ready in 1919.

Program of Meeting

Central Electric Railway Association

The program has been announced for the annual meeting of the Central Electric Railway Association at the Hotel Cleveland, Cleveland, Ohio, on Feb. 27 and 28. The session will be opened at 9.30 a.m. At 2 p.m. the executive committee will meet. There will be an address by Mayor Davis, Cleveland, and F. W. Coen, president of the association and vice-president and general manager of the Lake Shore Electric Railway, Sandusky, Ohio, will make his annual address. There will be a business session and reports of committees, followed by a paper "Ethical Aspects of the Street Railway Situation," by R. T. Sullivan, general manager of the Mahoning & Shenango Railway & Light Company, Youngstown.

The session on Feb. 28 will open at 9 a.m. The business meeting and presentation of reports of committees will be followed by the presentation of a paper "Power House Economics," by G. H. Kelsay, electrical engineer of the Union Traction Company of Indiana, Anderson, Ind., and a paper "Development of Freight Traffic on Interurban Lines," by A. B. Cole, assistant to the manager of the department of publicity of the Westinghouse Electric & Manufacturing Company, East Pittsburgh. The presentation of these papers will be followed by a general discussion by members of the association. The meeting will be concluded with the reading of the annual reports of the secretary and treasurer and the election and installation of officers for the ensuing year.

Financial and Corporate

P. R. T. Net Earnings Fall

Traffic Revenues Gain in 1918, but Burden of Operating Expenses and Taxes Is Too Heavy

The results of operation of the Philadelphia (Pa.) Rapid Transit Company for the year ended June 30, 1918, reflected the tremendous industrial and economic developments of this country concentrated upon the prosecution of the war. The larger gross revenues indicated the expansion of the shipbuilding, munition and other essential or contributory war industries located in Philadelphia and vicinity, while the greater increase in operating expenses was the result of the war-time costs of labor and material.

GROSS EARNINGS INCREASE 6.62 PER CENT

The gross earnings for the year ended June 30, 1918, showed an increase of $1,890,336 or 6.62 per cent. The passenger earnings rose 6.60 per cent and the receipts from other sources 7.26 per cent. The increase in operating expenses and taxes amounted to $2,578,410 or 16.1 per cent. The principal items contributing to this abnormal increase were the higher wages paid, the increased price of coal and other materials, the larger appropriations for maintenance and renewals, and the additional allowances to provide for federal war taxation.

NET EARNINGS DECLINE 5.5 PER CENT

The net earnings from operation, on account of the preponderating increase in operating expenses and taxes, fell off $688,073, or 5.5 per cent. The fixed charges showed a net decrease of $11,189, which was occasioned by the reduction in interest charges on car trust certificates, bonds, etc., maturing during the year or retired through the operation of sinking funds. The resultant surplus for the year, therefore, declined $676,884 or 24.3 per cent.

Two semi-annual dividends of 2½ per cent upon full paid stock of $29,985,800 were declared from the surplus earnings for the year ended June 30, 1918, as follows: Dividend No. 3, payable Jan. 31, 1918, 2½ per cent, $749,645; dividend No. 4, payable July 31, 1918, 2½ per cent, $749,645; total, 5 per cent, $1,499,290.

$4,884,077 IN SURPLUS ACCOUNT

The asset account for "leases, franchises, construction, equipment, advances to leased lines, sinking funds, etc.," showed a balance of $113,478,757 on June 30, 1918, this figure representing an increase of $381,959 for the year. The capital charges for additions and betterments amounted to $755,304.

The surplus of $4,884,077 as at June 30, 1918, represented the undistributed net earnings during the period of the Stotesbury management. Of this total surplus accumulation $2,653,438 was represented by additional cash or cash assets, the balance of $2,230,639 having been temporarily advanced to finance capital expenditures. A total of $1,382,000 of the 5 per cent bonds of the 1912 issue are held by the company available for sale to reimburse the treasury on account of such appropriations from surplus for capital requirements, besides which the abnormally large inventories should ultimately liquidate into much free cash.

During the period to June 30, 1918, $753,880 of the 1910 strike expense of $934,346 (incurred by the former management) was amortized through appropriations from surplus, these charges exhausting the initial surplus of $607,099, as of Dec. 31, 1910, and requiring in addition $146,780 of the surplus acquired during the period.

INCOME STATEMENT OF PHILADELPHIA RAPID TRANSIT COMPANY FOR YEARS ENDED JUNE 30, 1917 AND 1918

	1918		1917	
	Amount	Per Cent	Amount	Per Cent
Earnings:				
Gross passenger earnings	$29,318,138	96.30	$27,504,040	96.32
Receipts from other sources	1,125,813	3.70	1,049,574	3 68
Total earnings	$30,443,951	100.00	$28,553,614	100.00
Expenses:				
Maintenance and renewals:				
Maintenance	$3,544,219	11.64	$2,712,121	9.50
Reserve fund for renewals	1,022,373	3.36	1,570,921	5.50
Total appropriation	$4,566,593	15.00	$4,283,042	15.00
Operation of power plant	2,576,845	8.47	1,694,151	5.93
Operation of cars	7,843,021	25.76	7,129,739	24 97
General	1,750,668	5.75	1,498,826	5.25
Taxes	1,845,454	6.06	1,398,412	4 90
Total expenses	$18,582,581	61 04	$16,004,171	56 05
Net earnings from operation	$11,861,370	38.96	$12,549,443	43.95
Fixed charges:				
Interest	$2,268,492	7.45	$2,280,179	7.99
Rentals	7,365,891	24.19	7,365,393	25.79
Sinking fund, city contract	120,000	0.40	120,000	0.42
Total	$9,754,383	32.04	$9,765,573	34.20
Surplus	$2,106,987	6.92	$2,783,870	9.75

Receivership Plea Renewed

United Railways, St. Louis, Again Called Upon to Defend Itself in Receivership Action

The United Railways, St. Louis, Mo., on Feb. 7 filed a general denial of the allegations set forth in the petition of John W. Seaman, New York, a preferred stockholder, who asks that certain directors be ousted from office, the contracts which the company has for Keokuk water power through a distributing company, owned by the North American Company, be canceled or turned over to the company, and that a receiver be appointed for the United Railways to bring about these and other reforms.

The receivership petition had for its chief allegation that the water-power contracts cost the United Railways $400,000 yearly in excess of what a reasonable charge for the power would be and that they already had caused the company to lose in excess of $1,000,000; that certain practices of the legal department, notably in the mill tax case, were wasteful; that the company's claim department was unreasonably expensive and that a system of interlocking directorates make the operation of the company for the sole benefit of the North American Company, which is the holding company for the United Railways.

It is asked that the defendant directors (who are still directors) and the other individual defendants be made to reimburse the company for losses accruing to the company through their alleged mismanagement of the company's funds.

DEFENDANT'S PLEA

The answer of the United Railways either is a clause-by-clause flat denial of the statements of the petition or else a plea that the company is ignorant of the allegations set forth.

It declares that the United Railways has no knowledge of what profits accrue to any other company through contracts which it has for electric energy. It sets forth that the United Railways has no connection with the distributing company and had no interest in that company other than to see that the power was delivered and that the price agreed upon was maintained.

The defendants in the suit are the United Railways, Richard McCulloch, as a director of United Railways in 1908 when the power contracts were made; Henry S. Priest, as director and general counsel in that year; Festus J. Wade, as director; Annie E. Huttig, as beneficiary and trustee under the will of Charles H. Huttig, a director; the Mercantile Trust Company, as executor and trustee of the will of James Campbell, a director, and John I. Beggs, director.

Early in 1918 a similar application was denied by the court on the ground that the allegations did not justify a receivership and showed no cause for action.

Heavy Loss in New York

Lines in Metropolis Lost $4,600,000 or 44 Per Cent of Net Income in Fiscal Year 1918

A falling off of $4,647,964 or 44 per cent in net income was the result of operation for the rapid transit and surface electric railways in New York City for the year ended June 30, 1918. Detailed figures are given in the accompanying statement.

The names of most of the surface operating lines have been omitted from this table, the New York Railways being the only one shown separately. The Third Avenue System is included partly in the totals for the Manhattan Borough surface lines and partly in those for the Bronx Borough surface lines.

INCOME STATEMENT OF NEW YORK CITY ELECTRIC RAILWAYS FOR YEAR ENDED JUNE 30, 1918

Company	Railway Operating Revenue Amount	Railway Operating Revenue Increase	—Operating Expenses— Amount	—Operating Expenses— Increase	Railway Taxes	Gross Income	Deductions from Income	Net Corporate Income Amount	Net Corporate Income Increase
Hudson and Manhattan.... ..	$4,679,367	$437,090	$2,226,406	$469,999	$332,562	$3,056,790	$2,449,584	(c) $607,206	D $111,238
Interborough Subway division	21,840,447	385,555	9,159,182	1,041,579	1,649,411	18,219,408	13,556,649	(d) 4,662,758	D 4,222,599
Interborough Elevated division	18,657,280	246,026	9,954,154	1,488,463	2,109,171				
Brooklyn Rapid Transit Co.... .	30,925,303	884,882	19,532,278	1,375,639	1,897,123	10,596,591	8,745,255	1,851,336	D 857,643
Manhattan Surface Roads.	19,781,436	1,171,762	13,324,064	379,672	1,749,094	6,354,785	6,804,443	D 449,657	607,295
New York Railways	11,920,033	425,924	8,131,470	262,660	1,170,223	3,245,457	3,399,091	D 153,633	D 5,580
Bronx Surface Roads (a)	4,279,892	510,406	3,229,491	166,749	290,100	797,429	917,146	D 119,717	304,984
Queens Surface Roads (b).....	2,258,616	D 321,629	2,194,320	D 127,148	121,845	D 43,546	627,302	D 670,849	D 208,569
Other companies	1,977,845	2,311	986,640	95,088	83,012	178,399	278,519	D 100,119	D 160,191
Grand total (a).....	$103,500,189	$3,316,404	$60,606,538	$4,890,043	$8,232,321	$39,159,858	$33,378,901	$5,580,957	D$4,647,964

Note—D indicates a decrease or deficit.

(a) Excluding Yonkers Railroad. (b) Excluding Brooklyn Rapid Transit Company. (c) Balance applicable for adjustment income bonds. (d) Exclusive of $2,508,508 of "deficit accruals under rapid transit contracts.

Most of the loss in net corporate income, it is apparent, came from the decline of $4,222,599 for the Interborough Rapid Transit Company, on account of the operating expenses rising more rapidly than the operating revenues and on account of the taxes and fixed charges increasing substantially. The surface lines in Manhattan and the Bronx, unlike those in Queens, showed a smaller total deficit in 1918 than in 1917, but all the groups of surface lines reported deficits from the operation for 1918.

The total number of passengers carried for the twelve months ended June 30, 1918, was 1,975,511,690, a gain of 56,699,464. This gain was divided generally among the rapid transit lines and the Bronx, Manhattan and Brooklyn surface lines, the Manhattan surface roads coming first in the latter class with 31,348,175. The Brooklyn elevated lines carried 31,699,403 more passengers, but this gain was cut to 18,660,548 by the losses on the surface lines in that borough.

The revenue car-miles totaled 329,538,712, an increase of 2,329,664. The passenger car-hours numbered 28,939,839.

Lackawanna Line Suspends

The Buffalo & Lackawanna Traction Company, Buffalo, N. Y., has suspended the operation of cars over its lines between its terminal in Lafayette Square, Buffalo, and the Lackawanna (N. Y.) city line. Failure on the part of the company to secure from the city the right to charge a higher rate of fare together with the action of the City Council in denying the company's application to abandon its transfer agreement with the International Railway are given as reasons by Harry Evers, receiver for the company, for the company's decision to discontinue service. The receiver says the company's income is not sufficient to pay operating expenses.

The Buffalo & Lackawanna Traction Company owns no rolling stock. It leases its cars from the Buffalo & Lake Erie Traction Company. The latter company will continue to operate half hourly service during the day and hourly service at night over the Buffalo & Lackawanna Traction Company's tracks into Buffalo from Lackawanna and points west.

In a statement notifying the public of the discontinuance of the service, the receiver of the Buffalo & Lackawanna Company says:

> The receiver is wholly without funds with which to meet operating deficits, and has no choice but to suspend the service. If the Public Service Commission or anyone else can show us how to operate the road without loss under the present circumstances, we will run the line.

Tax Case Before State Supreme Court

Argument was heard and decision reserved on Jan. 15 by the Supreme Court of Pennsylvania on the appeals of the Philadelphia (Pa.) Rapid Transit Company from the decision of Court of Common Pleas No. 3, which held it liable in ten cases of its underlying companies for the payment of the income and excess war-profit taxes levied by the government, under the war-revenue and tax measures passed by Congress.

The taxes in controversy amounted to upward of $360,000. As to three of the companies—the Continental Passenger Railway, the Philadelphia & Darby and the Green & Coates Street Passenger Railway—the Philadelphia Rapid Transit Company, which also leased these lines, won the decision of the lower court.

The amount of taxes in these three cases was only about $12,000. The provisions of the leases in the three cases did not specify that the Philadelphia Rapid Transit Company should pay all future taxes levied on the leased lines, as they did in the other ten cases, where it was held by the lower court the provisions of the lease were binding on the Philadelphia Rapid Transit Company.

St. Louis Valuation Plans

Commission Preparing to Carry Out the Work Before Present Six-Cent Fare Time Expires

The Public Service Commission of Missouri is proceeding with its plans for valuing the property of the United Railways, St. Louis. It will be necessary for the commission's entire accounting and engineering departments to remove to St. Louis during the work, and for that reason the men in these departments have been at work cleaning up the audit and valuation of the properties of the St. Joseph Railway, Light, Heat & Power Company at St. Joseph and of companies elsewhere before beginning work at St. Louis.

While the commission's accountants and engineers have never made an audit or valuation of the United Railways, the members of the commission held a hearing upon the valuation made by the city and the company, and the evidence offered by the parties, and put in the 6-cent fare as an emergency measure for a temporary period of one year, in order to enable the railway company to employ labor, purchase supplies and render service under war conditions.

In the emergency just mentioned there was not time for the commission to make an audit and valuation through its own expert departments and it accepted for the purpose of its temporary order the value of $60,000,000 which had been agreed upon between the city and the company, the commission apportioning $52,800,000 to the property within the city and $7,200,000 to the property outside of the city.

The commission's accountants and engineers plan to begin work by Feb. 15 and have their report completed in time for the further hearing proposed to be held by the commission on or before June 1, 1919, the date of the expiration of the temporary 6-cent rate.

In referring to the scope of the present inquiry the commission said:

> The commission feels it is fortunate in having very able accounting and engineering departments which have successfully audited the books and accounts, and valued the property of many large utilities in this State. They are men of long experience in their particular line of work, well qualified to duly classify proper and improper operating charges of any public utility, and their work in St. Louis will be thorough complete, fair and impartial. The case will also be set down for a public hearing and investigation at St. Louis before the commission of the company's receipts and expenses, and the value of its property, and the commission hopes to be able authoritatively to settle these questions.

Receiver for Indiana Road

Robert M. Feustel, president of the Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., was appointed receiver of the company on Feb. 10, after a suit had been filed by the Evans Coal Company, asking that such action be taken. The demand of the coal company is for $12,000.

Mr. Feustel stated that for several years past the security holders of the Fort Wayne & Northern Indiana Traction Company have recognized that the earnings of the property were not sufficient to take care of operating expenses, taxes and the necessary fixed charges. For the last two years he said default has been made in the interest on more than 90 per cent of the bonded indebtedness of the company and this interest money has been devoted to operation and betterments.

During this period the security holders have been working on plans for a reorganization of the company, and the appointment of a receiver at this time, it is said, is for the purpose of bringing about some satisfactory reorganization.

Financial News Notes

New Director of Texas Electric Railway.—At the annual meeting of the stockholders of the Texas Electric Railway, Dallas, Tex., the former directors were elected with the exception that T. F. Bush, Waco, succeeds W. W. Seley, who died on Dec. 26.

Authorized to Junk Road.—The Exeter, Hampton & Amesbury Street Railway, Exeter, N. H., was authorized on Jan. 10 by the Public Service Commission to discontinue its lines to Hampton Beach any time after May 1 if a sale cannot be effected before that time which will bring more than the junk value of the road.

Value for Taxation Reduced.—A reduction of $743,662 in the valuation for assessment purposes placed by the Newark, N. J., tax board on cars of the Public Service Railway has been allowed by the Essex County Board of Taxation. The valuation fixed by the city board was $2,888,000. The reduction leaves a total of $2,144,338, upon which the company must pay taxes.

Ottawa Traction Company Report.—The Ottawa (Ont.) Traction Company, Ltd., during the calendar year 1918 received from its subsidiary, the Ottawa Electric Railway, the sum of $260,040 and paid this out in four quarterly dividends of 1 per cent and a bonus of 1 per cent. No figures are presented for the operating company in the 1918 annual report of the parent concern.

Interest Money Available.—A dividend of 50 cents was declared on the stock of the United Power & Transportation Company, Camden, N. J., payable on Jan. 31 to holders of record of Jan. 14. A Philadelphia paper states that this payment, together with other income received by the Inter-State Railways, will provide for the semi-annual interest requirements on Inter-State Railways 4's so that the Feb. 1 coupon could be paid as usual. In January, 1918, dividend of $1.32 was paid and in July $1.20.

A. E. & C. Deficit Increasing.—The deficit of the Aurora, Elgin & Chicago Railroad for 1918 was $251,193 according to a report made by the company to the city of Aurora, Ill. When the Council voted last summer to allow the company a 6-cent fare on the Aurora city lines it was agreed that a monthly statement of the company's finances would be furnished to the city officials. The latest report shows that for the ten months ended October the deficit was $185,898, while for the eleven months ended November it was $218,307.

Wants to Merge Short Line.—The New York State Railways has applied to the Public Service Commission for the Second District, for permission to merge the East Side Traction Company in Syracuse. The petition states that the stock of the East Side Traction Company is owned by the New York State Railways. The East Side Company was leased on Aug. 7, 1899, to the Syracuse Rapid Transit Railway and operated by it until Oct. 31, 1912, when the Syracuse line became a part of the New York State Railways. The road is 6.44 miles in length.

Majority Bonds Deposited. — The committee representing the 5 per cent first consolidated forty-year gold bonds of the Colorado Springs & Cripple Creek District Railway, Colorado Springs, Col., F. J. Lisman, chairman, announces that a substantial majority of the bonds has been deposited with the committee, and that the committee has extended the time for the deposit of additional bonds up to and including Feb. 21. Deposits should be made with the New York Trust Company, depositary, or the Mercantile Trust & Deposit Company, Baltimore, agent for the depositary.

Bonds to Settle Damage Claims.—The Southern Cambria Railway, Johnstown, Pa., recently filed a certificate of notification with the Pennsylvania Public Service Commission for the issuance of $100,000 of 5 per cent income bonds, dated Jan. 1, 1919, and due Jan. 1, 1929. The bonds are to be issued in payment of damage claims resulting from a wreck on the company's property in August, 1916. As a result of this wreck the company was placed in the hands of a receiver in 1917, but it is expected that the receivership will be removed as soon as the damage claims are settled.

New American Railways Issue.—The American Railways, Philadelphia, Pa., made a new issue of $3,000,000 of 7 per cent gold notes dated Feb. 1, 1919, due Feb. 1, 1922, $1,672,000 of which has been issued to retire a like amount of notes maturing on Feb. 1, 1919, and the balance for corporate purposes. The major part of the notes maturing on Feb. 1, 1919, was exchanged for the new notes dated Feb. 1, 1919. Newburger, Henderson & Loeb, Philadelphia and New York, and Bioren & Company, Philadelphia, have placed the remainder of the $3,000,000 new issue. These were offered at par and interest.

Two Weeks More for B. R. T. Claimants.—Judge Julius M. Mayer of the United States District Court, has resettled a previous order so as to permit the filing of claims of all kinds against the companies in the Brooklyn (N. Y.) Rapid Transit receivership up to April 1, 1919, an extension of two weeks. It was also provided that claimants need not go before ex-Judge E. Henry Lacombe, the special master, unless their claims have been disallowed by the receiver, Lindley M. Garrison. It was also made clear that no attempt would be made to prevent the bringing of suits for jury trials, a matter regarding which there has been some misunderstanding.

Idaho Deficits for 1917.—During the calendar year 1917, according to the latest annual report of the Idaho Public Utilities Commission, three of the six electric railways operating in the State showed deficits. The companies so reporting were the Boise Valley Traction Company, $534; the Spokane & Inland Empire Railroad, $462,002, and the Ogden, Logan & Idaho Railway (now the Utah & Idaho Central Railroad), $249,717. The Caldwell Traction Company showed net income of $10,959 for 1917, and the Lewiston-Clarkston Transit Company net income of $6,748. The Boise Railroad did not report. During the first half of 1918 two lines, the Sand Point & Interurban Railway, Ltd., and the Twin Falls Railroad were dismantled, as noted in the ELECTRIC RAILWAY JOURNAL of Jan. 4.

Seeking Deposits of New Orleans Notes.—A committee of which Clarence L. Harper, Harper & Turner, Philadelphia, Pa., is chairman is soliciting deposits of the one-year 7 per cent gold notes of the New Orleans Railway & Light Company, New Orleans, La. In order that the holders of the notes may have a general knowledge of the affairs of the railway, the committee is distributing a summary of a statement made by Francis T. Homer, president of the American Cities Company, which owns the greater part of the capital stock of the railway, and also a tabulated comparison of valuations placed on the properties of the railway. A bondholders' protective committee for the refunding and general lien 5 per cent gold bonds of the New Orleans Railway & Light Company, has also been formed. The committee is composed of George K. Reilly, chairman; John S. Newbold, Arthur Morton, George A. Colston and Lynn H. Dinkins.

Further Diversifies Its Holdings.—The Washington Water Power Company, Spokane, Wash., has taken over the Spokane Heat, Light & Power Company. It is understood that the deal was put through on a small cash payment, the creditors and security holders of the light and power company, which has been in the hands of a receiver for several months, agreeing to take an issue of $1,400,000 twenty-year unsecured debentures of the purchasing company, which will bear interest at the rate of 3 per cent for the first six years, 4 per cent for the next seven years, and 5 per cent for the remaining seven years. It is also understood that the Washington Water Power Company will continue the operation of the heating company's steam distributing plant and will operate the acquired property as a subsidiary. The Washington Water Power Company has heretofore done a general light and power business and operated 110 miles of electric railway.

Refinancing Progress of United Railroads.—The two committees representing holders of the securities of the United Railroads, San Francisco, Cal., have arranged for a syndicate to take up at par $5,200,000 of underlying bonds of the company. The bonds in question are $1,800,000 of Market Street 6s, $400,000 of Ferries & Cliff House 6s, $2,000,000 of Omnibus Cable Railway 6s and $1,000,000 of Sutter Street Railway 5s. As for the $23,500,000 of United Railroads general mortgage 4 per cent bonds, on which default was made on Oct. 1, 1916, and on subsequent coupons, Jesse W. Lilienthal, president of the company, has always contended that in order to place the United Railroads securely on its financial feet, it was necessary that the fixed charges should be reduced to a minimum, and that either preferred stock or income bonds or both, should be substituted for this issue. It is now understood that the committees have acquiesced in some such arrangement.

$10,000,000 of Notes Offered.—Lee, Higginson & Company, the First National Bank, the Chase Securities Corportion, Ladenburg, Thalman & Company, Montgomery & Company, Hayden, Stone & Company and Kean, Taylor & Company, have formed a syndicate to sell $10,000,000 Philadelphia Company three-year 6 per cent gold notes to be secured by 200 per cent in par value of a new issue of first refunding and collateral trust mortgage 5 per cent bonds. At a special meeting of the stockholders of the Philadelphia Company on Feb. 4 the stockholders authorized an increase in the indebtedness of the company to the aggregate amount of $100,000,000 and authorized a mortgage upon the property and franchises of the company to secure an issue of $100,000,000 of first refunding and collateral mortgage bonds, payable in twenty-five years and to bear interest at a rate not exceeding 6 per cent per annum and authorized an issue of $15,000,000 of three-year 6 per cent gold notes, of which $10,000,000 are to be issued at once.

Want Interest Payment Put Off.—All the receivers of the Pittsburgh (Pa.) Railways have joined in a petition to the court opposing the payment of the semi-annual interest due under the terms of the mortgage covering the Pittsburgh, Washington & Canonsburg Railway, of which the People's Savings & Trust Company is trustee. In opposing the payment the receivers point out that the total estimated net revenue of the company for 1919 would fall far short of paying fixed charges held against the company for rentals and bond and mortgage interest, if none of the net revenue was spent for improving tracks, equipment and service, or in meeting other municipal obligations or in paying the large items of taxes. The court was further informed that the receivers have completed a budget covering the entire railway situation and the problems confronting the receivers, and that they desire to submit this budget for consideration at the time a hearing is fixed by the court on the Pittsburgh, Canonsburg & Washington Railway Company's petition. They accordingly ask that action by the court be delayed until that time.

Public Service Corporation Notes Offered.—Drexel & Company, Philadelphia, Pa., and Bonbright & Company, Inc., New York, N. Y., are offering, at 98½ and interest (to yield more than 7.55 per cent), three-year secured convertible 7 per cent gold notes of the Public Service Corporation of New Jersey, Newark, N. J. The note issue is limited to the $12,500,000, all now to be issued. They are dated March 1, 1919, and are due March 1, 1922, redeemable at the corporation's option in whole or in part on sixty days' notice. The notes are convertible at the option of the holder at any time prior to Dec. 31, 1921, or until and including the date of any earlier redemption, into new 8 per cent cumulative preferred stock of the corporation on the basis of 100 per cent for the notes and 101½ per cent for the stock upon thirty days previous notice. The Fidelity Trust Company, Philadelphia, Pa., is trustee of the issue. The proceeds of the notes and of the preferred stock presently to be subscribed for will pay off maturing notes, discharge floating debt, provide additional working capital and diminish materially the annual interest charges. Approximately $32,000,000 has been expended on extensions and betterments in the last five years; $5,500,000 of this amount has been financed by the sale of bonds, the remainder being represented by $7,500,000 of notes maturing March 1, 1919, $5,000,000 of common stock of the corporation and short-term loans, etc. The present issue is part of the financial plan outlined in the issue of the ELECTRIC RAILWAY JOURNAL for Feb. 1, page 250. The notes were all sold in a very short time after they had been offered for public subscription.

Electric Railway Monthly Earnings

BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, ME.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1 m., Dec., '18	$82,935	*$57,514	$25,421	$20,271	$5,150
1 m., Dec., '17	83,790	*45,341	38,449	19,665	18,784
12 m., Dec., '18	923,122	*596,735	326,387	239,096	87,291
12 m., Dec., '17	886,120	*502,053	384,067	228,442	155,625

CHATTANOOGA RAILWAY & LIGHT COMPANY
CHATTANOOGA, TENN

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1 m., Dec., '18	$177,162	*$134,029	$43,133	$32,683	$10,450
1 m., Dec., '17	132,286	*131,844	442	31,164	†30,722
12 m., Dec., '18	1,843,947	*1,441,613	402,334	376,118	26,216
12 m., Dec., '17	1,356,732	*1,138,693	218,039	360,087	†142,048

COLUMBUS RAILWAY, POWER & LIGHT COMPANY, COLUMBUS, OHIO

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1 m., Dec., '18	$417,737	*$286,056	$131,681	$63,153	$68,528
1 m., Dec., '17	385,269	*290,974	94,295	49,535	44,760
12 m., Dec., '18	4,264,485	*3,113,068	1,151,417	695,457	455,960
12 m., Dec., '17	4,024,186	*2,943,929	1,080,257	558,589	521,668

COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY,
GRAND RAPIDS, MICH

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1 m., Dec., '18	$2,179,221	*$1,405,949	$773,272	$539,771	$233,501
1 m., Dec., '17	1,996,288	*1,338,117	658,171	454,220	203,951
12 m., Dec., '18	21,918,061	*14,929,845	6,988,216	6,037,313	950,903
12 m., Dec., '17	19,723,763	*12,285,005	7,438,731	5,289,106	2,149,625

EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1 m., Dec., '18	$406,855	*$329,466	$77,389	$70,935	$6,434
1 m., Dec., '17	357,987	*243,634	114,353	69,883	44,470
12 m., Dec., '18	4,215,887	*3,303,317	912,570	813,289	99,281
12 m., Dec., '17	3,692,472	*2,481,520	1,210,952	785,382	425,570

GRAND RAPIDS (MICH.) RAILWAY

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1 m., Dec., '18	$117,656	*$91,372	$26,284	$18,911	$7,371
1 m., Dec., '17	117,238	*87,260	29,978	19,945	10,033
12 m., Dec., '18	1,278,348	*1,020,487	257,861	233,087	24,774
12 m., Dec., '17	1,303,860	*910,176	393,684	218,215	175,469

LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY,
LEWISTON, ME.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1 m., Dec., '18	$79,624	*$69,279	$10,345	$19,735	†$9,390
1 m., Dec., '17	62,331	*61,625	706	15,665	†14,95
12 m., Dec., '18	894,784	*791,106	103,678	227,610	†123,932
12 m., Dec., '17	898,378	*683,684	214,689	186,689	†28,000

NASHVILLE RAILWAY & LIGHT COMPANY, NASHVILLE, TENN

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1 m., Dec., '18	$272,227	*$198,661	$78,566	$38,381	$40,18
1 m., Dec., '17	223,117	*136,403	86,714	40,137	46,577
12 m., Dec., '18	2,866,213	*1,896,867	969,346	481,635	487,69
12 m., Dec., '17	2,458,321	*1,589,418	868,903	490,071	378,83

PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1 m., Dec., '18	$744,002	*††$445,324	$298,678	$188,894	$109,78
1 m., Dec., '17	594,020	*479,885	114,135	179,036	†64,901
12 m., Dec., '18	7,669,389	*††4,855,890	2,813,499	2,218,187	595,31
12 m., Dec., '17	6,023,510	*3,576,593	2,446,917	2,152,032	294,86

*Includes taxes † Deficit †† For the month $22,545 and for twelve month $230,307 included for depreciation.

Traffic and Transportation

Binghamton Wants More

Despite Claim by City of Fare Limitation Court Instructs Receiver to Apply to Commission

William G. Phelps, as receiver of the Binghamton (N. Y.) Railway, on Feb. 3 applied to the Public Service Commission for the Second District of New York for an order authorizing a 6-cent fare in Binghamton to be continued during "the war in which the United States government is now engaged with the German Empire and for two years thereafter." The petition was signed by Mr. Phelps as receiver. The commission will investigate and order a public hearing.

Mr. Phelps' petition recites that he was appointed receiver under an order of the United States District Court on Oct. 8, 1918, and that he is in possession of the company, which was incorporated on Dec. 6, 1901, by the consolidation of the Binghamton Railroad and the Binghamton, Lestershire & Union Railroad. The receiver says:

> That upon entering upon the duties of said receivership, your petitioner ascertained, and believes to be true, that on account of the changed financial and economic conditions brought about by the war in which the United States Government is now engaged, especially the great increase in the cost of fuel and materials necessary for its operation, the prices of which have increased 200 and in some instances 300 per cent, the advance in wages of labor, increase in taxes and operating expenses generally, together with a falling off in receipts, a surplus in earnings in 1917 was changed to a large deficit, by reason of which the Binghamton Railway Company was unable to pay its operating expenses, interest on its bonds and its outstanding obligations.

The company submits statements of its financial condition in 1914, 1915, 1916 and 1917, and the first half and the first nine months of 1918 and a schedule showing the increase in the prices of materials and supplies. The net corporate income follows:

1914, $51,924; 1915, $79,759; 1916, $102,535; 1917, $81,971; 1917, first half, $60,682; 1918, first half, $18,748 deficit; 1918, nine months, $32,717 deficit.

The road operates in Binghamton, towns of Port Dickinson and Union and Port Dickinson, Johnson City, Endicott and Union, and the receiver alleges that a 5-cent fare is insufficient to yield a reasonable compensation for the service rendered, is unjust and unreasonably low and does not give an average return on the value of the property, is confiscatory and unless the rate is increased to a reasonable and just rate operation of the road must cease. The receivership was brought about to conserve and protect the property and operate the road under the Federal Court until some means can be devised to relieve it from its financial difficulties.

Operating expenses, it is alleged, have increased from $321,473 in 1914 to $446,545 in 1917, and in the first six months in 1918 expenses increased $31,173 over the first six months in 1917. During the first six months of 1918 the road's revenues decreased $27,525, as compared with the corresponding period in 1917, and during the first six months in 1918 the company's deficit was $18,748 as against a surplus of $60,682 for the corresponding period in 1917. Taxes for 1919 will be at least $7,500 more than in 1918. Four increases in wages have been made within the past three years.

Receipts from Oct. 10, 1918, to Oct. 31, 1918, including the lighting plant, were $29,690; disbursements $29,791, a deficit of $100 not including interest on bonds, taxes, insurance or any existing indebtedness, claims for damages, betterments or necessary repairs.

The financial condition of the company, it is stated, has not resulted from waste, extravagance, over capitalization, excessive salaries or bad management.

The receiver says that on Oct. 29 he applied to the United States Court for instruction to apply to the commission for permission to ask for an increased fare, the city contending that the rate of fare was limited by ordinances restricting the fare to 5 cents. The city opposed the application in the United States Court. Trial was had and on Jan. 22 a decree was rendered in favor of the receiver and, it is claimed, is a final adjudication against the city and other municipalities, directing the receiver to make application to the Public Service Commission for the Second District, for an order authorizing an increased rate of fare to be charged by the Binghamton Railway.

The commission will hear the petition in Binghamton on Feb. 21.

Would Repeal Rate Restriction

Governor James P. Goodrich of Indiana in his message to the General Assembly urges the repeal of the 2-cent law. He says:

> The status of the railroads of the country will be determined by Congress in the near future. If the roads go back to private ownership immediately, or in the near future, there is an urgent necessity for action on the part of the states to remove existing statutory rate restrictions. The railroads in Indiana, as in all other states, are now operating under a rate of 3 cents per mile, which was authorized by the federal railroad administration. If federal control should end, and unless prior action is taken, the roads will immediately pass back under the rate restrictions of the several states. Such an action would surely prove fatal to transportation, and to the economic conditions of the country.
>
> Therefore, I recommend the repeal of the present statutory railroad rate restriction in Indiana, and urge that the power of determining such rates be vested in the Public Service Commission of Indiana until the permanent status of the railroad companies is fixed.

Des Moines Fare Unchanged

Citizens, However, Will Get Only Such Service as the Fare Will Support

Judge Martin J. Wade of the Federal Court has denied the application of the receivers for the Des Moines City Railway for an increased rate of fare. While Judge Wade's ruling is regarded by attorneys for the city of Des Moines as a victory, the ruling sets out that if the company's earnings are not sufficient to meet the fixed charges provided for in the franchise and pay for the present service the service must be adjusted to the income.

Immediately upon receipt of the ruling officials of the Des Moines City Railway announced that a general curtailment of service would go into effect within the next two weeks. Owl cars are to be abandoned, lines now on a seven-minute service are to be reduced to ten-minute service and non-productive lines are to be further reduced as to service. There is to be no curtailment of rush-hour service according to the announcement.

Judge Wade holds that the franchise is a contract and that the fares fixed therein are definite and binding and that they cannot be increased. In this connection Judge Wade rules that the terms of the franchise as regards service are as binding upon the people as upon the company. The court said in part:

> The only question involved before the court is whether or not section 17 of the franchise, fixing the fares at six for a quarter, is to be construed with section 7, which provides for the payment from the fares of all costs of operation, including taxes and interest, at not to exceed 5 per cent on the company's indebtedness represented by bond, and not to exceed 6 per cent on the remainder of such indebtedness and the setting aside of a depreciation fund.
>
> It is the contention of the receivers, and for the purpose of this hearing only the contention is assumed to be true, that the income from fares will not pay the cost of operation, taxes, interest and depreciation and continue the present service.
>
> It is here apparent, of course, that if this contention is true, fares will have to be increased or service reduced.
>
> The court cannot close its eyes to the fact that in controversies over franchises for street railway companies, the thing most important in the minds of the people is the rates of fares. Fares touch the people most directly and I have no doubt from all the evidence before the court that so far as the people of Des Moines are concerned they assumed that the fare was definitely and finally determined by this franchise.
>
> Of course the people of Des Moines cannot have service which will not be paid for out of the fares. The receivers are claiming that the service demanded by the city of Des Moines cannot under present changed conditions be rendered from the present income. If this claim is true, of course, it is most unfortunate; and yet these parties have made a contract and the court cannot modify its provisions.
>
> That the contract did not contemplate a change of fares is further emphasized by the omission from the contract of any method of fixing higher fares.
>
> New conditions may render it absolutely impossible for the people to get, under the contract, what they expect in the way of service, but the people are bound by the contract as well as the company, and when they get that service which can be paid for under the provisions of the contract, they must be content.

Emil G. Schmidt, president of the Des Moines City Railway, announces that there will be no appeal from Judge Wade's ruling.

A Small Road's Problem

Three-Cent-a-Mile Charge Under Government Replaced by Seven Five-Cent Zones

As the result of several conferences between the Public Service Commission of Massachusetts and the Grafton & Upton Railroad, the latter has agreed to try out for an experimental period a new fare plan under which the road is to be divided into seven zones, with a 5-cent fare in each. Under this plan the through fare will be the same as suggested by the petitioners, but the 5-cent unit of fare for zones of approximately 2 miles each should prove more convenient both to the company and to the public.

JOINT OPERATION PROVIDED

As the portion of the line between Milford and Hopedale is now operated by the Milford & Uxbridge Company on its own line and under its own tariff, the passenger rates from Milford to Hopedale and other points on the Grafton & Upton Railroad are not included in the local passenger tariffs to be filed by the Grafton & Upton Company. With this exception, all the present workingmen's tickets are to be retained at a rate 40 per cent in excess of that prevailing prior to June 10, 1918, which corresponds with the proposed increase in the cash rates as compared with those in effect prior to the same date.

SYSTEM HAS 18.10 MILES OF LINE

The Grafton & Upton Railroad runs from North Grafton through the towns of Grafton, Upton and Hopedale to Milford. It has a total mileage of 18.10 miles, including a loop 2.73 miles long in the town of Upton which was acquired through purchase of the railway of the Upton Street Railway. This loop line retains the status of a street railway, as the Grafton & Upton Company did not acquire the right to operate a railroad upon that location.

Under the authority of the same statute the Grafton & Upton Company, on Oct. 1, 1902, entered into a contract, which still remains in effect, with the Milford & Uxbridge Street Railway, under which the latter company supplies the cars, car employees, and the power, and maintains the overhead system, for the operation of the passenger service and the transportation of baggage, express and mail matter of the Grafton & Upton Company between North Grafton and Hopedale. The portion of the line between Hopedale and Milford is now used for freight traffic only, the passenger service between these points being performed by the Milford & Uxbridge Company on its own line and under its own tariff. By virtue of this arrangement the Grafton & Upton Company furnishes passenger service through the medium of the Milford & Uxbridge Street Railway between North Grafton and Hopedale by way of the Upton loop, a total distance of 13.60 miles, and directly operates the freight service between North Grafton and Milford by way of the main line, a distance of 15.37 miles. By the terms of the contract between the two companies the Grafton & Upton company receives a stated sum of $9,500 a year plus one-fourth of the gross passenger receipts in excess of $25,000, and the remainder of the passenger receipts go to the Milford & Uxbridge Company.

GOVERNMENT TOOK OVER ROAD

On Jan. 1, 1918, the federal government took over the possession, use, control and operation of the Grafton & Upton Company. At that time, the road was divided into five zones, with a 5-cent fare in each. On June 10, 1918, the United States Railroad Administration established a uniform one-way rate for passenger transportation of 3 cents a mile, with a minimum charge of 10 cents, upon all railroads under federal control. On June 24, 1913, the company was discharged from federal control, but the rates meantime established have remained in effect except as modified by a tariff supplement effective on Aug. 1, 1918, which provided for a reduction of the minimum fare for a ride of 2 miles or less from 10 cents to 6 cents.

The petitioners claimed that the passenger service of the Grafton & Upton Company is essentially a street railway service rather than a railroad service, that the rates should be established according to railway rather than railroad standards, and that upon this basis the existing rates are excessive.

The company contended that its status as a railroad had been established, but suggested that, if the present system of mileage zones is inconvenient to the public, it might be willing to provide for a division of the road into 6 fare zones, with a 7-cent unit of fare. This plan would make no change in the through rate for the entire line, but would result in certain readjustments of fares between intermediate points.

New York's Accident Record

In the second serious accident within ten days on the Third Avenue Elevated Railroad of the Interborough Rapid Transit Company, six persons were hurt, at 8.15 a.m., on Feb. 8, at 120th Street and Third Avenue when a northbound seven-passenger-car local train of wooden cars ran into an empty train, made up of composite cars, standing idle on the tracks.

In the accident on Jan. 30, a rear-end collision on the Third Avenue Elevated at 175th Street, one woman was killed and thirty persons injured.

The number of deaths in accidents on subway and elevated lines in 1918 was greater than in any other year on record. The total of killed was 177. The largest in any preceding year since 1910 was eighty-three in 1914. Of the 177 deaths last year, ninety-nine were due to the Malbone Street accident in Brooklyn in which a train of cars left the track. Aside from this there were seventy-eight deaths, seven more than in 1917 and eight more than in 1916. The number of persons killed in surface car accidents in 1918 showed a marked decrease, dropping from 157 in 1917 to 119 last year, accounted for in part by the decrease in surface line traffic.

An official table showing accidents of all kinds, whether to equipment or to human beings, of casualties of all kinds, and of deaths on the subway and elevated lines in New York City follows:

Year	Accidents	Casualties	Killed
1913	12,435	11,009	71
1914	12,358	11,598	83
1915	11,610	11,336	74
1916	13,572	13,478	70
1917	15,372	15.092	71
1918	12,455	12,692	177

The table of accidents for the same period on the surface lines is as follows:

Year	Accidents	Casualties	Killed
1913	54,854	30,342	155
1914	54,128	29,416	134
1915	48,176	27,142	94
1916	51,535	28,585	116
1917	52.195	28,526	157
1918	41.086	21,643	119

Defines Public's Interest

J. F. Porter, president of the Kansas City Light & Power Company, Kansas City, Mo., was invited to address the Kansas City Chamber of Commerce on Jan. 8 on the subject of the attitude of cities toward their public utilities. Unusual interest attached to the address because of the recent strike of the employees of the Kansas City Railways and the recent fare increase. Mr. Porter said in part:

> The Public Service Commission looks after the interests of the public, the customers, but it also looks after the interests of the investors. If it raises rates it is criticised, but there have been cases where the rate was too low to render a just return to the investor. The company must have a fair return or go broke and the customers suffer. If the situation were understood the commission would be encouraged to fix rates for adequate returns on investment when costs are high so that prices might be reduced when costs decline. If the people who complain were sincere they would say in such times as these: "Those securities are low, I'll make an honest dollar by buying them." If they cannot trust the commission which says the company should have 6½ per cent return for its investors these people should get behind the utilities and make their securities more valuable.
>
> The fundamental basis of utility operation is service. You want service. What do you say to sitting in and helping dictate the company's policies so far as the commission will allow? You who pay for service pay what the commission, after examining our books, says is a fair price.
>
> You are interested in costs, because when anything happens to costs it also affects the rates. A lower rate for yourself may increase your costs of service in another direction. You are interested in every judgment against the company, for every judgment affects rates.
>
> When some one says, "That company or corporation should be stopped from doing such and such a thing," think of your own interest in such an estoppel. Be sure that the thing opposed is not some step necessary for economical and efficient service; the better the service the lower the rates. The less friction there is in the working of the company the easier and cheaper it is for the company to give good service at low rates. Public officials are realizing this and are assisting rather than hampering corporations in improvements required for better operations.

Rome (N. Y.) Hearing Closed

The application of the New York State Railways, to the Public Service Commission for the Second District of New York for a 6-cent fare in Rome, was submitted to the commission on Jan. 15 for determination. Mayor H. C. Midlam and Corporation Counsel M. J. Larkin represented the city. Walter N. Kernan and B. E. Tilton, vice-president and general manager of the Utica and Syracuse lines, appeared for the railroad company. Patrons of the railroad company in Rome protested against present service there and considerable evidence was submitted.

The railroad company, through Mr. Tilton, put in proof as to the financial operations of the Rome road for the first eleven months in 1918. Mr. Tilton said the receipts of the Rome line for the eleven months were $57,490, showing a decrease of 14.2 per cent over the same months in 1917. The expenses for the eleven months were $69,583, or a deficit of $12,092. The fare receipts included all fares in Rome and to Stanwix. The expenses do not include legal expenses, salaries of general officers and fixed charges, including interest on bonds and return on capital invested. Wages of conductors and motormen were increased from 31 cents an hour early in the year to 35 cents and then to 45 cents, the latter rate the result of the War Labor Board's award. Mr. Tilton said the earnings per car-mile in Rome were the lowest of any city he knew.

Mr. Tilton figured that the company, under the proposed increased fare, would receive about a 13 per cent increase in revenue or about $8,317. He estimated a falling off in traffic of 1½ per cent over 1918.

Mr. Tilton told Mr. Larkin that the reduced revenues were not due to the reduced service. He acknowledged that there had been demands for better service. To this Mr. Larkin replied that the company was not entitled to increased fare because of the service given. He was informed by Mr. Tilton that the base schedule in Rome had not been reduced, only the tripper service.

The hearing was declared closed unless either party desires to submit additional evidence after the company's figures are checked up.

Trenton Service Still Unsatisfactory

The Board of Public Utility Commissioners of New Jersey has rebuked the Trenton & Mercer County Traction Corporation for failing to carry out all the recommendations of the commission's order of Nov. 27. The inspectors' report shows that poor service is due mainly to lack of discipline among the crews, inability to maintain proper schedules, inadequate maintenance of rolling stock and an insufficient number of cars. Suggestions made by the inspectors follow:

The company should insist on the obedience of its operating rules by the employees, particularly the car crews.

Greater alertness and general activity on the part of the traffic inspectors on the streets.

Improvement in the repair and maintenance of rolling stock and installation of additional facilities for carrying out this work.

The operation of additional cars during rush hours or the substitution for the present small cars operated during this period of larger cars.

The separation of the system into three divisions, each under the supervision of one or more inspectors of supervisors, each of whom shall be held directly responsible for the operation of his particular division.

At the suggestion of Peter Witt the railway placed an order for twenty one-man cars, each to carry thirty-two persons. The company recently received six of these cars and will experiment with them under an agreement, whereby they may be returned to the manufacturers for large cars if the small ones are deemed to be unsuitable.

Jitneys Reappear in Des Moines

Jitneys made their first appearance in a number of years on the streets of Des Moines, Iowa, during the week ended Jan. 18. City officials state they will arrest all drivers who have not compiled with the city ordinances, which require an indemnity bond and compel the jitneys to follow established routes. The autos in service formerly plied between Camp Dodge and Des Moines.

Denver Retrenching

The Denver (Col.) Tramway is retrenching in every direction in an effort to reduce expenses to a point that can be met with the revenue from the 6-cent fare during the time that the company is waiting for the result of the investigation of the committee of fifty appointed by the city's consumers, labor and commercial organizations. In December the company secured a fare of 7 cents plus 1 cent for transfers from the Public Utilities Commission, but as a result of the ruling by the Supreme Court on Jan. 15 in the telephone case, to which reference was made in the ELECTRIC RAILWAY JOURNAL for Jan. 25, page 206, the company put the fare back to 6 cents. The court held that the Utilities Commission had no jurisdiction over rates in home-rule cities in Colorado. The 6-cent rate had been authorized by both the City Council and the Utilities Commission, whereas the 7-cent rate was authorized only by the Utilities Commission. The 6-cent fare being inadequate to pay the company's bills it reduced service, laid off about 150 employees, stopped all construction and street improvement work and abandoned two lines. These abandonments and the changes in operating schedules were discussed in *Tramograms* for Feb. 1.

Transportation News Notes

One-Man Cars Suggested.—The introduction of one-man cars on the Country Club, Brooklyn, Ingalls Park and Fourth Avenue lines of the Chicago & Joliet Electric Railway has been proposed to the City Council of Joliet, Ill.

Denied Excess Fare Charge.—The Public Utilities Commission of Illinois has denied the petition of the Chicago, North Shore & Milwaukee Railroad, Highwood, Ill., for permission to charge an excess fare to passengers who fail to purchase tickets before boarding cars.

Another Increase Denied.—The Public Service Commission of Indiana has denied a petition of the Cincinnati, Lawrenceburg & Aurora Railroad, Cincinnati, Ohio, for an increase in intrastate passenger rates. The commission ascertained that the company is losing money, but found that most of this was loss on the Ohio end of the line.

200 Coupon Book for $2.—The New York State Railways, Rochester Lines, on Feb. 17 will put into effect a new tariff regulation providing for the sale by conductors and agents of a 200 coupon book for $2 entitling the holder to $2 worth of transportation on the Rochester lines except in Rochester. The minimum detachment will be five coupons.

Talks to Trainmen in Dallas.—Motormen and conductors of the Dallas (Tex.) Railways are holding regular meetings for the exchange of ideas on how to improve the railway service and to hear addresses from heads of the operating departments. At recent meetings, the men were addressed by the general manager, and by the assistant to the president.

Fare Increase Suspended.—The Public Utilities Commission of Illinois has suspended until Aug. 14 the application of the East St. Louis & Suburban Railway, East St. Louis, Ill., for a proposed increase in passenger fares. The company wanted to advance rates 10 cents between Belleville, Ill., and St. Louis, Mo. Two new collection zones, one additional in Belleville and one additional in East St. Louis, were proposed.

Maintaining Schedules in Dallas.—The Dallas (Tex.) Railway, as a means of improving schedules and making for faster time, has installed markers exery six or seven blocks along its lines. These consist of easily discernible signs suspended from the span wires. Each motorman is supplied with schedule cards showing the time due at each of these markers. This system has been put into effect by Dan Fisher, assistant to the president and also in charge of publicity.

Co-operating in Freight Campaign.—Electric railways operating out of Indianapolis united in a full-page advertisement in the Indianapolis papers relative to the annual Indiana Poultry Show. Express service from all parts of the State to Indianapolis, the "Hub of Hoosierdom" is made a prominent feature of the publicity matter. The Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis & Cincinnati Traction Company, Interstate Public Service Company, and the Union Traction Company of Indiana all joined in the advertising.

Short Strike in Wichita Falls.—Conductors and motormen of the Wichita Falls (Tex.) Traction Company went out on a strike recently because the company refused their demands for recognition of the union and for a wage increase from 30 cents to 40 cents an hour, and for a shorter work day. The men have been working twelve hours a day for 30 cents an hour. They now want an eight-hour day with extra pay for overtime. The company was unable to move cars for several days, but finally employed other men and has resumed service.

Two-Mile Line Feels Pinch.—The receipts under the present fare of the St. Louis & Jennings Railway, St. Louis, Mo., are insufficient, according to statements made by officers of the company at a recent hearing before the Public Service Commission of Missouri on the company's petition for an increase of fares. The city of St. Louis has ten days in which to file an answer to the petition. The company operates about 2½ miles of track from the northern terminus of the Bellefontaine Street line of the United Railways, St. Louis, to the town of Jennings, St. Louis County.

Fare Reductions Ordered.—The Public Service Commission for the Second District of New York at its regular session on Feb. 4 ordered George Bullock as the receiver of the Buffalo & Lake Erie Traction Company, beginning on Feb. 6 to charge only 5 cents, with transfers, in the city of Buffalo on all cars where he is now charging 13 cents without a transfer, to reduce to 10 cents, the fare between the city of Lackawanna and the city of Buffalo on such cars as he is now charging passengers 14 cents, and to restore the sale in the city of Lackawanna of strips of seven tickets for 25 cents which he discontinued in January last and charged 5 cents fare.

Relief in Sight in Richmond.—Final vote in the Common Council of Richmond, Va., the city's lower legislative body, on the measure increasing fares on the lines of the Virginia Railway & Power Company in Richmond resulted on Feb. 3 in the passage of the ordinance by a vote of twelve to eight. The ordinance now goes to the Aldermen. The increases are as follows: A straight 5-cent fare to the general public, instead of the six tickets for 25 cents. Labor tickets, now sold at the rate of two for 5 cents, and good from 6 a. m. to 7 a. m., will be sold at the rate of six for 25 cents, and will be good from 6 a. m. until 8 a. m. School tickets will remain as at present.

Seven-Cent Minimum Charge.—The New York, Westchester & Boston Railway, New York, N. Y., on Feb. 1, by special permission of the Public Service Commission for the Second District, changed its tariff schedules affecting local passenger traffic as follows: Local one-way fare between any two points in any one zone, except between points in New York zone, Harlem River to Dyre Avenue, Bronx, inclusive, 7 cents, an increase of 2 cents. Increases varying in amounts from 2 to 5 cents in all interzone fares except between Wykagyl and Quaker Ridge. Commutation ticket fares, sixty and forty-six-trip, increased approximately 10 per cent. Baggage rates canceled and provision made for free transportation of baggage, not exceeding 150 lb. in weight per passenger, between points where the company has baggage facilities.

Service Ordered to Be Restored.—The Public Service Commission for the Second District of New York at its regular session on Feb. 6 ordered the New York State Railways, on or before Feb. 10, to restore service upon its lines in Rochester during non-rush hours so that operation shall conform to recommendations and requirements in the report of Charles R. Barnes, chief of the division of electric railroads, to the commission and to continue the service until further order. In its order the commission decided to enlarge the scope of its proceeding under the "show-cause" order directed to the company so as to include generally the company's service in Rochester. It was also decided to hold further hearing on Feb. 19 on the reports of Mr. Barnes to the commission and upon all questions concerning service on the company's lines in Rochester.

In a Spirit of Mutual Helpfulness.—Receiver Garrison of the Brooklyn (N. Y.) Rapid Transit Company called at the offices of the Public Service Commission on Jan. 21 and conferred for an hour with Commissioners Whitney, Hervey and Kracke; the commission's chief counsel, Godfrey Goldmark, and its special counsel, William L. Ransom, on the subject of increasing the efficiency of the Brooklyn Rapid Transit Company. The commission promised to do what it could to complete the rapid transit system so that trains could begin running, and to assist Mr. Garrison with schedules that would yield the maximum of service with the present equipment. It was also practically agreed that 250 new surface cars should be bought. There is no money available for these cars, but it was suggested that the surface companies could issue certificates of indebtedness, which could be accepted by the Brooklyn Rapid Transit Company and money furnished on them out of sums to be raised on receiver's certificates. There will be other conferences between the commission and Mr. Garrison.

New Publications

Electrical Blue Book

Eighth edition, 1918. Published by the International Trade Press, Chicago. Cloth, 274 pages. Price, $2.

This book contains the national electrical code, as recommended by the National Fire Protection Association, with illustrations and explanatory notes, and with the changes introduced in the latest revision of the rules made conspicuous by being printed in larger type. It also contains a list of inspected and approved electrical appliances and other information of value to the electrical contractor and installer of lighting and power equipment.

What is Fair?

By William G. Raymond. John Wiley & Sons, Inc., New York, N. Y. 172 pages. Cloth, $1 postpaid.

This little book is the attractive presentation of the author's ideas in regard to what is fair in the relationship between the public and utility owners. Mr. Raymond believes that no corporation serving the public should be made to feel that its property is of uncertain value because of intermittent regulation of rates according to no fixed rule. He has developed an equation to express the fair return for a utility under continuous regulation. The book as a whole represents an earnest effort to consider all the equities involved in one of the most complicated questions of the day.

The Financing of Public Service Corporations

By Milton B. Ignatius. The Ronald Press Company, 20 Vesey Street, New York, N. Y. 508 pages. Cloth. $5 postpaid.

The purpose of this work, according to the author, is the presentation of a comprehensive discussion of the important aspects of utility financing, from the inception of the enterprise and the issuance of securities to the expenditure of the proceeds and the recording of the facts. This purpose has been well carried out.

The book is an admirable survey of a field which is no longer of purely private concern, since the advent of the regulatory commissions. The part of the book most striking, because of its newness, is the discussion of the supervisory powers of the commissions over utility securities. Mr. Ignatius hits the nail on the head when he says that the future usefulness of such bodies depends upon the spirit with which they approach the task of outlining, without legal responsibility for results, the financial policies of utilities.

The book is written not only for that part of the general public which is interested in utility financing but also for those directly connected with utility operation. It therefore should be in the libraries of all utility men.

Personal Mention

W. J. Hodgkins has been appointed general superintendent of the Ironwood & Bessemer Railway & Light Company, Ashland, Wis., to succeed F. R. Winders.

Gust Johnson has been appointed engineer of maintenance of way of the St. Paul Southern Electric Railway, Hastings, Minn., to succeed Carl Erickson.

Allen Blanchard has been appointed master mechanic of the Trenton & Mercer County Traction Company, Trenton, N. J., to succeed Benjamin C. Bowers.

F. R. Burns has been appointed superintendent of the Blackstone division of the Worcester Consolidated Street Railway, Worcester, Mass., to succeed C. H. Sanborn.

W. I. Dill has been appointed secretary of the Burlington County Transit Company, Hainesport, N. J., to succeed Armitt H. Coate, who retains his position as treasurer of the company.

James Smith has been appointed master mechanic of the Atlantic Coast Electric Railway, Asbury, Park, N. J., to succeed J. H. Moor, who retains his position as chief engineer.

I. C. Elston, formerly secretary and treasurer of the Vicksburg Light & Traction Company, Vicksburg, Miss., has been elected president of the company to succeed William B. Walter.

Joseph N. McCallum, vice-president of the Vicksburg Light & Traction Company, Vicksburg, Miss., has also been appointed treasurer of the company to succeed I. C. Elston, who has been elected president.

A. G. McMasters has been appointed purchasing agent of the Lincoln (Neb.) Traction Company to succeed C. F. Greenberg, who, as noted in the ELECTRIC RAILWAY JOURNAL, resigned from the company, effective on Oct. 3.

E. Driscoll has been appointed assistant chief engineer of power station of the Tampa (Fla.) Electric Company to succeed L. P. Chaney, who was recently appointed chief engineer of the Pensacola (Fla.) Electric Company.

G. H. Kuhrts, formerly assistant general manager of the Los Angeles (Cal.) Railway Corporation, has been appointed general manager of the company to succeed Howard Huntington, who remains as vice-president.

R. M. Harding, who has been general superintendent and director of transportation of the Columbus (Ga.) Railroad for several years, has been made acting general manager of the company to succeed John S. Bleecker, who, as noted previously in the ELECTRIC RAILWAY JOURNAL, has become connected with the New Orleans Railway & Light Company.

Hartley Le H. Smith, who has been chief of the testing bureau of the Brooklyn (N. Y.) Rapid Transit System, has resigned to take charge of the steam engineering department of the New England Power Company, Worcester, Mass. He will have supervision of the steam-driven power stations of this company which are auxiliary to its hydroelectric power supply. He has been connected with the engineering staff of the Brooklyn Rapid Transit Company for more than sixteen years, having joined it for the purpose of looking after meter, coal, boiler and other testing work. The testing bureau was organized soon after he joined the staff and under his direction has grown to be a large department, with mechanical, electrical and chemical subdivisions each with its staff under competent supervision. The nature of the work done by this department is reflected in the series of articles contributed by Mr. Smith to the monthly mechanical and engineering issues of the ELECTRIC RAILWAY JOURNAL during the past year. Mr. Smith is thirty-nine years of age. He secured his elementary education in Camden, N. J. After leaving high school he attended Drexel Institute in Philadelphia and completed a three-year mechanic arts course and a two-year electrical engineering course. Immediately thereafter he spent one and a half years with the Camden & Suburban Railway as assistant to the electrical engineer who at that time had charge of power stations, rolling stock and lines. He left this company to join the B. R. T. staff as already mentioned. Aside from his direct work for his employers Mr. Smith has taken an active interest in the national engineering societies. He is a member of the American Institute of Electrical Engineers and the American Society for Testing Materials.

H. LE H. SMITH

B. E. Parker, Evansville, Ind., has been appointed general superintendent of railways of the Northern Ohio Traction & Light Company, with headquarters at Akron, Ohio. Mr. Parker occupied a similar position with the Evansville Public Utilities Company, and was superintendent of transportation of the Rockford, Ill., system before that time. He entered electric railway work in April, 1890, as a conductor at Muskegon, Mich. Going to Marion, Ind., some years later, he soon became local superintendent of the Union Traction Company, in which position he remained until 1911, when he went to Rockford.

Clifton W. Wilder, electrical engineer of the Public Service Commission for the First District of New York, and connected with that organization practically since its establishment in 1907, has resigned to join the staff of the New York Edison Company. Mr. Wilder was graduated from the Massachusetts Institute of Technology in 1896. He engaged in general engineering work pertaining to lighting, industrial and railroad properties in Boston and New York until 1907, when he entered the service of the commission as an assistant electrical engineer. In 1909 he was appointed electrical engineer and placed in charge of the equipment inspection bureau. Just previous to the signing of the dual subway contracts in 1913, Mr. Wilder's duties were extended so as to include the engineering matters coming before the commission pertaining to the equipment of the rapid transit lines constructed under the dual contracts and the related elevated railroad certificates. In the past seven years the staff of the bureau under Mr. Wilder's direction has passed upon the plans for and purchase of equipment by the two companies amounting to nearly $100,000,000. Mr. Wilder has also had charge of appraisals of the property of several of the large public utility corporations under the jurisdiction of the commission.

Obituary

Randolph S. Reynolds, secretary of the Curtain Supply Company, Chicago, Ill., died of pneumonia on Jan. 20. Mr. Reynolds became connected with the Curtain Supply Company in 1912. Prior to that time he was with the Western Steel Car & Foundry Company, at Anniston, Ala., and the Pressed Steel Car Company at Pittsburgh, Pa., having been connected with the purchasing departments of these companies from 1905 to 1912. He left the Pressed Steel Car Company in 1912 to accept a position with the Curtain Supply Company and later was made assistant to the general manager. On April 30, 1918, he was elected secretary of the company, to succeed Holmes Forsyth, who on that date became president.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER,
SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Large Swiss and Swedish Electrification Projects

German Methods Retard Work, But United States Aid Is Sought—Many Millions Involved

Electrification of railroads in Europe, particularly in those countries where quantities of cheap water power are available, did not get far during the war although last fall the subject apparently was revived. In Switzerland and Sweden especially were large projects contemplated, involving the expenditure of millions of dollars for equipment.

Switzerland has been working under extreme hardships in the last four years with reference to the proposed change-over of her railroads from steam to electricity, and for new electric lines. With only one workable iron-ore deposit in the country and little coal she has been dependent for her supplies of these commodities on the Central Powers, as the Allies were unable to provide sufficient for her use. *Commerce Reports* of Nov. 29, 1918, issues a report submitted under date of Oct. 11, 1918, by Commercial Attaché Pierce C. Williams, wherein is shown Germany's control over Swiss supplies of iron and steel for the electrification of Swiss railroads, in its endeavor to keep a grip over its Swiss competitors in the electrical industry.

Switzerland was then engaged in the electrification of a portion of the railway connecting the country with Italy through the St. Gotthard tunnel, and to complete this work there were required great hydroelectric stations, miles of transmission lines, steel poles and locomotives. Swiss workshops were ample to handle all of this work, but with the inability of the Allies to furnish the materials, Switzerland felt the necessity of accepting the German steel. Although Germany at this time was unable to make deliveries, that country succeeded in keeping the Swiss works from receiving as much work as they could handle thereby retarding the work of electrification. It was enabled to hold Switzerland to the bargain made years ago at the opening of the St. Gotthard convention, whereby the right to participate in the tenders with Swiss firms for electrical apparatus was received by Germany.

That the Swiss really desired to import steel and other railway supplies from the United States was shown in a letter which the Attaché had just received from a steel importer in Geneva. Herein it was stated that in his dealings with the Swiss railroads for the importation of steel poles, American licenses, unfortunately, were not being granted at that time and freight conditions were such that the buying of American poles had to be abandoned, thus obligating them to the Germans for poles. He pointed out the importance of the growing Swiss railroads and the large American field for all electrification material.

In a previous *Commerce Reports*, page 524, Vice-Consul R. E. Schoenfeld, writing on Sept. 20, 1918, shows that Switzerland is making every effort to utilize her great sources of water power to provide for the electrification of her railways. The General Director of Swiss Federal Railways has submitted a detailed plan of electrification to the Council of Administration of these railways for approval. On the basis of expenditures outlined, it would be necessary to count during a series of years, possibly up to thirty, on the following expenses of construction: installation of electric traction $5,000,000, construction of new lines $300,000, works of completion $7,200,000, rolling stock $5,400,000. This totals $17,900,000 per year for the first ten years, after which the amount would decrease to approximately $16,000,000 a year for possibly twenty years.

The Federal Direction foresees great difficulty in financing these construction operations with Swiss capital, and looks to the United States for financing part of the construction and supplying the raw material.

200,000 HP. OF WATER POWER NEEDED IN SWITZERLAND

The amount of water power necessary has been estimated at an average of 200,000 hp. at the axis of the turbines. Sufficient water power concessions have already been obtained to supply three-quarters of the system.

As to the electrification of the Swedish railways, translation of an article in the "Social-Demokraten" of September 20, 1918 states:

The Swedish railway committee was instructed by the King of Sweden in the end of 1915 to investigate the practicability of electrifying the railways of the Kingdom.

The potential water power of Sweden is immense, of which 4,000,000 turbine horsepower is now being developed. The great reduction in the supply of coal and the increase in the cost has accentuated the importance of developing Sweden's water power. This development has naturally been hampered during the war by the absence of metals necessary for the manufacture of turbines, dynamos, and other machinery and wires for power transmission.

Current Price Changes for Supplies

Wire, Galvanized Pole Line Hardware and Cotton Tapes Show Decreases

Prices generally remain unchanged. There have been some decreases however.

Rubber-covered wire-base averages 25 cents, a drop of about 3½ cents from last week. One manufacturer quotes on a 28-cent base, one on 27 cents, six on 25 cents, two on 24 cents, one on 22-cent base and two on cost. Those quoting on the high bases apparently figured that business could not be stimulated merely by a change in prices and therefore saw no reason to reduce. Bare wire was reported on a 21-cent base, weatherproof on 22½ to 24-cent base and annunciation on 30-cent and 37-cent bases.

Galvanized pole line hardware has declined approximately 10 per cent.

White cotton tape has been reported by one jobber as off 10 to 15 per cent. Friction tape has been reported as lower in only one instance, and that was about 8 per cent. The drop in cotton brings that commodity to a level which some believe is close to bottom.

Inquiries failed to disclose any drop in the price of rail bonds following the drop in copper last week by the big copper producers.

Pneumatic Door and Step Control Gaining

Further Installations Show Popularity of This Safety Equipment Applied to Both New and Old Cars

While reports show that but few traction companies have ordered large numbers of new cars equipped with pneumatic door and step control, manufacturers report that a large number of roads have either ordered a small number of new cars so equipped or are having some of their old cars remodeled to incorporate this safety feature. The manufacturers are also working on many inquiries for these devices from roads which have not yet entered this field but which are watching carefully the results of cars so equipped on other lines.

Depending upon the class of service to be rendered under different conditions, the safety features are being applied to heavy as well as to light cars. For instance, the inquiries coming from Toronto indicate that the safety control would be incorporated in the new pay-as-you-enter cars of the heavy type, rear end entrance. The majority of the applications, however, appear to be for light cars.

Of the more recent cases which have come to notice, where safety equipments either are under contemplation or have already been ordered, inquiries are under way for 50 cars for Brooklyn, while six new cars of a previous order are already on their way, some of which have been delivered. Boston has the matter up, Erie contemplates fifteen cars, and Milwaukee is remodeling some of its cars to incorporate this feature. Bridgeport has twenty safety cars, Trenton has recently received four new ones and the Richmond Light & Railway Company has received one out of the twenty new safety cars ordered last year. The Third Avenue Railway Company is using twenty-five cars on its Mount Vernon and New Rochelle lines, embracing safety features of its own design.

New Advertising Literature

Unit Railway Car Company, Newton, Mass.: Pamphlet on a kerosene or fuel oil burner, steam operated railway car for railroad, interurban and city use.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.: Six-page reprint of an article in the *Magazine of Wall Street* for September, 1918, by W. H. Easton, entitled "The Advantages of Railroad Electrification."

Heine Safety Boiler Company, St. Louis, Mo.: An eighty-six-page treatise on steam boilers, entitled "Boiler Logic." The topics treated include: (1) Some fundamental considerations in boiler design; (2) practical baffling of water-tube boilers; (3) boilers for different fuels, firing and services; (4) overloads; (5) boilers as pressure vessels, and (6) details of construction of Heine boilers. The pamphlet contains much practical information which should be of use to power station operators and an aid in producing economies in station arrangement and operation.

Rolling Stock

Kitchener & Waterloo Street Railway, Kitchener, Ont., expects within the next six weeks to purchase two 45-ft. pay-as-you-enter four-motor passenger cars.

Nipissing Central Railway has two motor passenger cars on order with the Preston Car & Coach Company and will shortly be in the market for two more cars of similar type.

Decatur Railway & Light Company, Decatur, Ill., is considering the purchase of ten new city cars, to cost approximately $65,000. General Superintendent M. L. Harry has secured the approval of Vice-President Executive H. E. Chubbuck of the Illinois Traction System for the purchase of the cars.

Trade Notes

Edison Storage Battery Company, Orange, N. J., has moved its New York sales office to 247 West Thirty-fifth Street.

Huntly H. Gilbert, who left the service of the Pressed Steel Car Company and Western Steel Car & Foundry Company at the start of the war, to enter the Army as captain in the Ordnance Department at Washington, and later was commissioned major and transferred to the Rock Island Arsenal, has re-entered the service of these companies as assistant manager of sales, Western district, at 425 Peoples Gas Building, Chicago, Ill.

International Register Company, Chicago, Ill., has recently received from the Boston Elevated Railway an order for 275 motor-driven coin registers to take money and metal tokens. These registers will be installed on the new surface cars ordered by the Boston Elevated Railway. The machines to be used are similar to the coin registers previously supplied to the railway by the same manufacturer but have an extra totalizer for registering metal tokens.

Arthur F. Braid has been appointed sales manager of the metal and alloy department of the Metal & Thermit Corporation. Mr. Braid joined the company seven years ago as a traveling salesman, but after a few years of most successful service in this capacity he was appointed assistant superintendent of the Jersey City plant, in charge of the manufacture of carbon-free metals and alloys. When the United States entered the war, he assumed active charge of the metal sales at the New York office of the company. Mr. Braid is a member of the American Iron & Steel Institute, the British Institute of Metals and many other societies and scientific organizations.

NEW YORK METAL MARKET PRICES

	Jan. 30	Feb. 13
Copper, ingots, cents per lb.	19	17.50
Copper wire base, cents per lb.	28.75	20.75
Lead, cents per lb.	5.50	5.00
Nickel, cents per lb.	40	40.00
Spelter, cents per lb.	7.00	6.80
Tin, cents per lb.	†72.50	†72.50
Aluminum, 98 to 99 per cent., cents per lb.	†33.10	†33.10

† Government price in 50-ton lots or more' f. o. b. plant.

OLD METAL PRICES—NEW YORK

	Jan. 30	Feb. 13
Heavy copper, cents per lb.	15.50 to 16.00	14.50 to 15.00
Light copper, cents per lb.	12.00 to 12.25	11.50 to 12.00
Heavy brass, cents per lb.	9.00 to 9.50	8.00 to 8.25
Zinc, cents per lb.	5.00 to 5.25	5.25 to 5.50
Yellow brass, cents per lb.	7.00 to 7.50	6.50 to 6.75
Lead, heavy, cents per lb.	4.50 to 4.75	4.75 to 4.25
Steel car axles, Chicago, per net ton	$28.00 to $30.00	$28.00 to $30.00
Old carwheels, Chicago, per gross ton	$24.00 to $25.00	$22.00 to $23.00
Steel rails (scrap), Chicago, per gross ton	$22.00 to $23.00	$16.50 to $17.50
Steel rails (relaying), Chicago, gross ton.	$50.00 to $55.00	$50.00 to $55.00
Machine shop turnings, Chicago, net ton	$6.50 to $7.50	$6.00 to $6.50

ELECTRIC RAILWAY MATERIAL PRICES

	Jan. 30	Feb. 13
Rubber-covered wire base, New York, cents per lb.	27	25
Weatherproof wire (100 lb. lots), cents per lb., New York	30.75	31.25 to 33.75
Weatherproof wire (100 lb. lots), cents per lb., Chicago	32.76 to 36.75	30.75 to 35.75
T rails (A. S. C. E. standard), per gross ton	$60.00 to $65.00	$60.00 to $65.00
T rails (A. S. C. E. standard), 100 to 500 ton lots, per gross ton	$57.00 to $60.00	$57.00 to $60.00
T rails (A. S. C. E. standard), 500 ton lots, per gross ton	$55.00 to $60.00	$55.00 to $60.00
T rail, high (Shanghai), cents per lb.	...	3½
Rails, girder (grooved), cents per lb.	...	4½
Wire nails, Pittsburgh, cents per lb.	3½	3½
Railroad spikes, drive, Pittsburgh base, cents per lb.	4½	3.90
Railroad spikes, screw, Pittsburgh base, cents per lb.	3.90 8	8
Tie plates (flat type), cents per lb.	3	3
Tie plates (brace type), cents per lb.	3	3
Tie rods, Pittsburgh base, cents per lb.	7	7
Fish plates, cents per lb.	3	3
Angle plates, cents per lb.	3	3
Angle bars, cents per lb.	3	3
Rail bolts and nuts, Pittsburgh base, cents per lb.	4.90	4.90
Steel bars, Pittsburgh, cents per lb.	2.70	2.70
Sheet iron, black (24 gage), Pittsburgh, cents per lb.	4.55	4.55
Sheet iron, galvanized (24 gage), Pittsburgh, cents per lb.	5.60	5.60
Galvanized barbed wire, Pittsburgh, cents per lb.	4.35	4.35

	Jan. 30	Feb. 13
Galvanized wire, ordinary, Pittsburgh, cents per lb.	3.95	3.95
Car window glass (single strength), first three brackets, A quality, New York, discount †	77%	77%
Car window glass (single strength, first three brackets, B quality), New York, discount	77%	77%
Car window glass (double strength, all sizes AA quality), New York discount.	79%	79%
Waste, wool (according to grade), cents per lb.	15	13 to 20
Waste cotton (100 lb. bale) cents per lb.	12	12
Asphalt, hot (150 tons minimum) per ton delivered	.....	.....
Asphalt, cold (150 tons minimum, pkgs. weighed in, F. O. B. plant, Maurer, N. J.), per ton	$43.00	$43.00
Asphalt filler, per ton	$45.00	$45.00
Cement (carload lots), New York, per bbl.	$3.20	$3.20
Cement (carload lots), Chicago, per bbl.	$3.34	$3.34
Cement (carload lots), Seattle, per bbl.	$3.68	$3.68
Linseed oil (raw, 5 bbl. lots), New York, per gal.	$1.48	$1.48
Linseed oil (boiled, 5 bbl. lots), New York, per gal.	$1.55	$1.55
White lead (100 lb. keg), New York, cents per lb.	13	13
Turpentine (bbl. lots), New York, cents per gal.	75	71½ to 72

* Government price. † These prices are f. o. b. works, with boxing charges extra.

Recent Incorporations

La Jolla Electric Line, San Diego, Cal.—Incorporated to construct an electric line from San Diego to LaJolla. Capital stock $250,000. Directors: Frank A. Riehle, Lemon Grove; Alice G. Ford, Ed. Twelker, Howard Hopkins and Lila McConnell, all of San Diego.

Franchises

Torrington, Conn. — The Torrington Traction Company has received an extension of time until the next session of the Legislature within which to begin construction on its proposed line between Torrington and Thomaston. [Oct. 9, '15.]

South Weymouth, Mass.—The Massachusetts Highway Service Company has received a franchise from the City Council of South Weymouth to operate a trackless trolley in South Weymouth.

Track and Roadway

Indianapolis Traction & Terminal Company, Indianapolis, Ind.—Work has been begun by the Indianapolis Traction & Terminal Company on the extension of the company's tracks in South Street from Virginia Avenue to Delaware Street.

Frankfort & Shelbyville Traction Company, Shelbyville, Ky.—It is reported that plans are being made to begin construction early in the spring on the proposed line of the Frankfort & Shelbyville Traction Company, between Frankfort and Shelbyville. F. H. Frankland of the engineering firm of Waddell & Son, Inc., New York, N. Y., and Kansas City, Mo., has been elected president of the Frankfort & Shelbyville Traction Company to succeed L. G. Smith of Shelbyville, who now becomes vice-president. F. W. Henkel, Chicago, is secretary and treasurer. [April 13, '18.]

Somers (Mass.) Electric Company.—A bill has been introduced into the House at Hartford, Conn., providing for the Somers Electric Company to purchase all the property and franchises of the Hartford & Springfield Street Railway and property and franchises of any other electric railway company operating in the towns of South Windsor, East Windsor, Windsor Locks, Suffield, Somers and any place in Massachusetts. The Somers Electric Company would be authorized to issue stock to an amount not exceeding $1,000,000 more than the amount under the authority of its charter. The bill was referred to the railways committee.

Worcester (Mass.) Consolidated Street Railway.—Officials of the Worcester Consolidated Street Railway have under consideration plans for improvements this spring and summer which will call for an expenditure of approximately $250,000. The work which the company would like to complete consists chiefly in laying new rails on some of the most important lines of the city. The work planned includes the laying of new rails on Green Street from Temple Street to Vernon Square, at an estimated cost of $40,000. The company also wants to put in new rails on Millbury Street from Cambridge Street to the South Works of the American Steel & Wire Company. A big West Side job is planned on the Tatnuck line and provides for new rails on Pleasant Street between Moreland Street and Mill Street. The company would like to put in new rails on Salisbury Street from Park Avenue to the end of the line. The relocation of the tracks on Belmont Street from Shrewsbury Street to the Lake is also under consideration.

St. Louis, Mo.—The city of St. Louis has decided to operate the passenger car line over the Free Bridge, beginning about March 1. The city will operate cars from Seventh and Gratiot Streets to the east end of the bridge only.

Pennsylvania & Ohio Railway, Ashtabula, Ohio.—A report from the Pennsylvania & Ohio Railway states that it will regrade and reballast 12 miles of track during 1919.

Toledo Railways & Light Company, Toledo, Ohio.—Discussing the requests of the people of West Toledo for a crosstown line and better car service, Frank R. Coates, president of the Toledo Railways & Light Company, said it is impossible for the company to make an expenditure such as this would necessitate without a franchise that would insure operation in the city for a sufficiently long period to warrant it. Mr. Coates has asked permission to extend the Cherry Street line to Stop 4 on Sylvania Avenue.

Brantford (Ont.) Municipal Railway.—The rate-payers of Brantford recently approved a bylaw authorizing the extension of the Brantford Municipal Railway into the Terrace Hill district and the provision of extra rolling stock at a total estimated cost of $125,000.

Fort Erie, Ont.—Announcement has been made by Sir Adam Beck of the Ontario Hydro-Electric Commission of Canada that work will be begun within the next few months on the proposed hydro-radial electric railway to connect Fort Erie with Niagara Falls and Port Colborne as one of the Canadian government's reconstruction plans. Another project which will be undertaken soon by the Dominion Government is the construction of an electric railway between Fort Erie and Hamilton, Ont. The road between Hamilton and Fort Erie is one link in the proposed line to connect Toronto and Buffalo. The Niagara, St. Catharines & Toronto railway line from St. Catharines to Niagara Falls, Ont., and St. Catharines to Welland and from Port Colborne to St. Catharines are parts of the Canadian Northern system which has been taken over by the Dominion Government. By taking over the Burlington radial line, the Hydro-Electric Commission is well started on its line between Toronto and Hamilton. The Hamilton, Beamsville & Grimsby electric line operates from Hamilton to Beamsville and it is only necessary to connect up the 12.4 miles between St. Catharines and Beamsville to have the completed line between Hamilton and Niagara Falls, Ont.

Canadian Northern Railway, Montreal, Que.—The Toronto Suburban Railway which operates 69.53 miles of city and interurban track is being acquired by the Canadian Northern Railway and will be operated as part of the Canadian National Railways. The Canadian Northern Railway is also acquiring the Toronto Eastern Railway Company's charter. This line is projected to run from Toronto to Cobourg, Ont. A contract was let and construction begun in 1914, grading being done from Bowmanville west to Pickering Village, 19.5 miles, and track was laid and ballasting done from Bowmanville to Whitby, 14.5 miles. No overhead or other electrical work was done, and, owing to the war, all construction was stopped.

Power Houses, Shops and Buildings

Athens Railway & Electric Company, Athens, Ga.—The Athens Railway & Electric Company is considering the installation of an additional boiler.

New Orleans Railway & Light Company, New Orleans, La.—The building of the New Orleans Railway & Light Company on Napoleon Avenue was recently destroyed by fire.

United Railways & Electric Company, Baltimore, Md.—Plans are being made by the United Railways & Electric Company for the construction of a steel and concrete passenger terminal and carhouse at Easton Avenue and Fifteenth Street, East Baltimore, to cost about $150,000.

Kansas City, Mo.—The excavation and grading of the site for the interurban station to be built at Tenth and McGee Streets will be begun soon. Contracts for the excavating are to be advertised within the next few weeks. It will take three months to complete the grading of the site and by the latter part of the summer the actual work on the eight-story building will be begun.

Sand Springs Railway, Tulsa, Okla.—Work will be begun in April by the Sand Springs Railway on the construction of a reinforced concrete and brick station and office building, 100 ft. x 40 ft., three stories.

Charleston Consolidated Railway, Gas & Electric Company, Charleston, S. C.—Rapid progress is being made by the Charleston Consolidated Railway, Gas & Electric Company on the construction of a new transmission system to Port Terminal, North Charleston. The company is also increasing the capacity of its power plant at Charleston.

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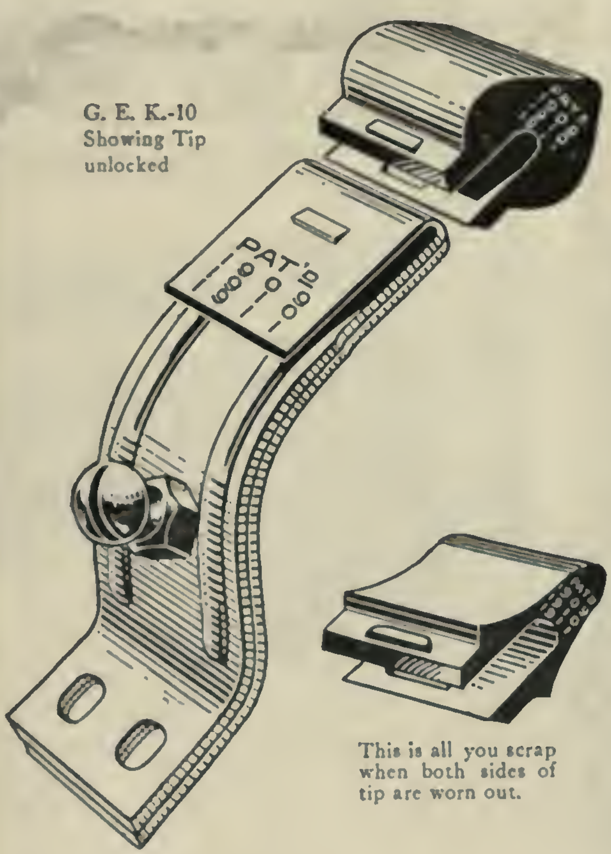

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TRIGGER-LOCK REVERSIBLE CONTROLLER FINGERS

ANNOUNCEMENT

Since the war started we have had difficulty in obtaining large enough quantities of extruded copper bar, from which we make the tips for Triggerlock Controller Fingers to meet the demand of our old customers, and could not take on new business. Notwithstanding the fact that we have not pushed the sales they constantly increased and during last year we sold more than five times as many fingers and seven times as many renewal tips as in 1914 and 90% of the total were orders from old customers who have standardized Triggerlock fingers.

Since December we have been able to secure plenty of metal supplies—and are now prepared to make prompt delivery of all orders.

It might be interesting for Electric Railway Master Mechanics to know that over 300 roads now use Triggerlock Reversible Controller Fingers—a large majority of them exclusively. It is our ambition to convince the other 600 roads that they should use them also. Simply send us a trial order. If you are interested in economy and greater efficiency you will do it now.

TRIGGERLOCK REVERSIBLE CONTROLLER FINGER

814-8 Bath Ave., Niagara Falls, N. Y.

557 King St. West, Toronto, Canada

DURADUCT

An Economy Product

On the Cars of the Louisville & So. Indiana Railway

Whether you operate light-weight city cars or the more substantial rolling stock like that required for the high-speed service of the Louisville & Southern Indiana Railway, you will find Duraduct equally adaptable for the protection of your car wiring.

War taught us a valuable lesson in Conservation. Those who have learned this lesson will use Duraduct—a real economy product. Because of its lightness (one-ninth that of metal conduit) it saves the carriage of hundreds of pounds of metal, *thus conserving coal;* because of its flexibility no laborious time-stealing bending is necessary, *thus conserving labor.*

All diameters from 2½ in. down.

TUBULAR WOVEN FABRIC COMPANY
MANUFACTURERS · PAWTUCKET · R. I.
A. HALL BERRY · GENERAL SALES AGENT
71-73 Murray Street, New York 9 So. Clinton Street, Chicago
WENDELL & MAC DUFFIE CO. 61 Broadway, New York City
Distributors for all foreign countries except Canada
Northern Electric Company, LIMITED Distributors for Canada

An Explanation to Present Subscribers of *Electric Railway Journal*

WE HAVE WRITTEN to every subscriber on our list regarding the increase in the subscription price of Electric Railway Journal which becomes effective March 1st.

We have not only sent you this notice as a matter of courtesy, but we have emphasized our sincere wish to serve you as fully as possible by offering you the opportunity of renewing your subscription in advance at the present $3 rate.

And in order to make sure of your receiving your notice and to impress upon you the urgency of renewing before March 1st, if you wish to accept this money-saving offer, we have written to you several times.

ALTHOUGH our subscription force is making every effort to avoid such a contingency, it sometimes happens that a subscriber receives a notice after he has already accepted the offer in reply to a previous notice.

The reason for this is that so many acceptances are coming in that it is not always possible to check them up to the hour of mailing with the letters going out.

We ask all subscribers who may receive an unnecessary notice to kindly ignore it. As soon as possible, your renewal will be acknowledged by a change in the date on the wrapper of your regular copy.

If you have not already accepted one of our special limited offers, please understand that it is your privilege to extend your subscription at the $3 rate for a year beyond the time to which you are now paid up, whenever that may be, no matter how recently you have renewed.

March 1st will soon be here—you must act quickly

McGraw-Hill Co., Inc., 10th Ave. at 36th St., New York.

Renew my subscription to ELECTRIC RAILWAY JOURNAL for one year beyond its present expiration date. I will remit $3 in 30 days. It is my understanding that this request will not be accepted if mailed after March 1st, when the advanced price goes into effect.

If you are not now a subscriber, check here ______

Name ______

Street ______

City ______ *State* ______

Company ______ *Position* ______

MAIL THIS COUPON TODAY

AD-4

Tear off this coupon and get it into the mail

NOW

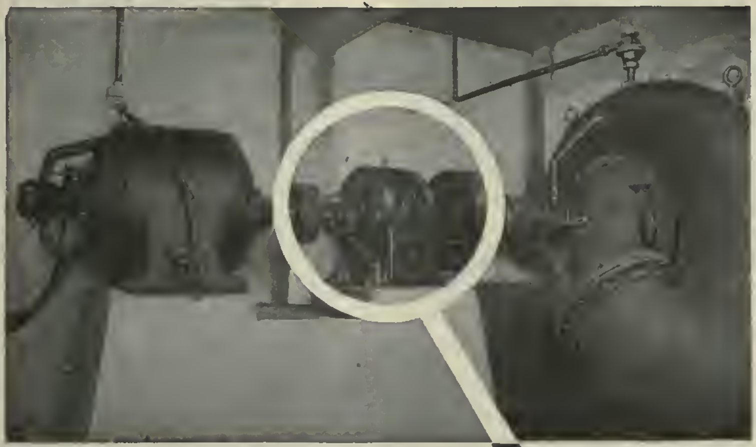
TODAY it is $3.
(In Canada, $4.50; foreign, $6)

MARCH 1 it will be $4.
(In Canada, $5.50; foreign, $7)

TURBOGEAR

FAST PATENTS

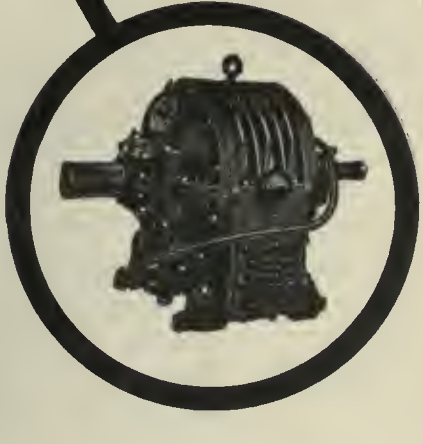
A 5½ to 1 Speed Reduction



WITHIN the power generating station itself there are many peculiar problems of power transmission not to be solved economically by ordinary methods. There are many cases where slow speed auxiliary apparatus like fans, blowers, compressors and stokers must be driven by high speed motors and turbines.

Take this case, for instance. Here is an 1800 r.p.m. motor driving a 27,000 gallon per minute centrifugal pump at 328 r.p.m. The connection is directly through a 200 hp. Turbo Gear, which transmits the power along the same axial alignment, in the same rotative direction, with the least frictional losses of any system of transmission.

Turbo Gear steps speed up with equal facility.



Write for Bulletin 200.

The Poole Engineering & Machine Company

Manufacturers of Gears and Power Transmission Machinery Since 1843

Baltimore, Maryland, U. S. A.

CHARLOTTE, N. C. ....Realty Bldg.
CHICAGO....................Old Colony Bldg.
DALLAS.........1405 Southwestern Life Bldg.
DENVER............First National Bank Bldg.
DETROIT................423 Dime Bank Bldg.
EL PASO......................615 Mills Bldg.
MILWAUKEE ....Wells Bldg.
NEW YORK....................50 Church St.
PHILADELPHIA............929 Chestnut St.
PITTSBURGH..........781 Union Arcade Bldg.
ST. LOUIS....................2211 Olive St.
SALT LAKE CITY............218 Judge Bldg.
SAN FRANCISCO.............503 Mission St.
SEATTLE.............2012 L. C. Smith Bldg.

"AS NEAR YOU AS YOUR TELEPHONE"
Make us prove it.
Becker's Pharmacy
TWO STORES:
61 Broad Street—613 King Street

The Housewife Lives Everywhere

Only the nationwide character of Collier Service makes it possible for THE HOUSEWIFE to appear on Car Cards from Maine to California.

An advertising organization of limited scope could not afford to prepare such cards.

The position of Collier Service in the advertising world enables us to keep the merits of every card up to the highest standard. This stabilizes the value of the advertising space in your cars, and consequently stabilizes your *revenue* from this source.

Barron G. Collier
INCORPORATED

Candler Building
220 West 42nd Street, New York City

In the California Bay Cities

Whether you ride through Oakland, Alameda and Berkeley on the electrified suburban lines of the Southern Pacific or on the Key Route's great network, you are pretty sure to find yourself in a Hale and Kilburn "Walkover" seat.

The 100 per cent. Southern Pacific installation will interest you as an example of a special-sized seat, for as these cars are very wide the seats on one side are made for three passengers.

The Key Route installation will interest you because of the easy action of the "Walkover" after years and years of service.

And when you leave Oakland for the trip to Sacramento over the Oakland, Antioch & Eastern Railway's magnificent line, you will ride in Hale and Kilburn seats, too!

Hale and Kilburn seating is found wherever it's the rule to buy the best, whether city, suburban, or electrification.

WALKOVER
COPYRIGHTED

Hale and Kilburn Corp.

Philadelphia
New York
Chicago
Washington
Atlanta
Louisville
St. Louis
Detroit
San Francisco

WALKOVER
COPYRIGHTED

McGraw Electric Railway List

for February, 1919

Ready February 17

It contains valuable information of the following character:

OHIO

AKRON. 140,000 (1917).

770—**Northern Ohio Traction & Lt. Co.**—Office, 206 Hamilton Bldg. (Controls Canton-Akron Consol. Ry. Co., which was formed by consolidation of the Canton-Akron Ry. Co., Canton-New Philadelphia Ry. Co. and The Tuscarawas Trac. Co.; also owns entire capital stock of Akron, Wadsworth & Western Trac. Co.) (Connects Cleveland, Akron, Canton, Massillon, Wadsworth, Barberton, Kent, Ravenna, New Philadelphia and Uhrichsville.)

Pres. B. C. Cobb,
14 Wall St., New York, N. Y.
V. Prests. { T. A. Kenney " "
Treas. & Gen. Mgr.
A. C. Blinn.......Akron
•Sec. Chas. H. Lahr............ "
Asst. Sec. & Asst. Treas.
Geo. Sprague, Jr.......14 Wall St.
New York, N. Y.
Gen. Audr. H. G. Kessler " " "
Audr. James Sweeney..........Akron
Gen. Supt. Ry. Dept.
Frank I. Hardy............. "
Gen. Supt. Elec. Dept.
L. G. Tighe................ "
Traffic Mgr. Chas. A. Laney..... "
Claim Agt. E. C. Carpenter...... "
Pur. Agt. Russell J. Harter..... "
Engr. Maint. of Way
E. D. Eckroad.............. "
Supt. Shops. K. D. Leavitt..... "
Park Mgr. C. Y. Riddle........Canton

Power sta. equip. 3 a. c. G. E. 3 ph., 25 cys.; 4600 hp. b.; Akron—5 a. c. turbo-gen. West. tot. 67,000 kw. 60 cys.; 15,600 hp. b. Bab. & W., Bad; 2750 hp. turb. (wtr.) Trump; trans. volt. 22,000-13,200 v.; trolley volt. 600 v.

19 sub-sta. tot. cap. 23,700 kw.; 30 rot. conv. 4 mo. gen. sets.

Power stas. at Canton and Arkon; repair shops at Kenmore, Canton and Silver Lake Jct.

Reaches Springfield Lake (leased) Meyers Lake (owned), Silver Lake Park (leased) and Summit Lake (leased).

240.5 miles; 4-8½ g.; 345 motor and 45 other cars; 1 elec. loco. Company does general ltg. and pwr. business. •78

The correct name and address of every electric railway in the United States, Canada, Mexico and West Indies.

The address of the main office.

The names of affiliated or controlling corporations.

The main points on the route.

The correct names and business addresses of the officers and officials.

The power plant equipment.

The transmission voltage.

The trolley voltage.

The substation equipment.

The location of the power stations and repair shops.

The parks reached and whether controlled or leased.

The mileage of the road.

The number and kind of rolling stock owned.

The gage of track.

Whether the Company also does a lighting and power business.

Whether a change in the Company has been made since the last edition was published.

In addition the McGraw Electric Railway List contains—

An alphabetical list of electric railway officials in the United States, Canada, Mexico and West Indies, with a ready reference by numbers to the road with which each man is connected.

An alphabetical index to all companies listed, including those also that are either operated by or consolidated with the companies under which number it is indexed.

A directory of all electric railway associations with the names and business addresses of the officers of each society.

The data are new, correct, complete, dependable. The book is a distinct and valuable service to the electric railway industry.

$7.50 per year (2 issues); $4.00 single copy.

A copy sent on ten day's approval.

McGraw-Hill Company, Inc.
36th Street at 10th Avenue, New York

McGraw-Hill Company, Inc.
36th St. at 10th Ave., New York

Please enter our subscription for the McGraw Electric Railway List for 1919—February and August—at $7.50 per year ($4 for a single number.)

Company...

Address...

Signed by...

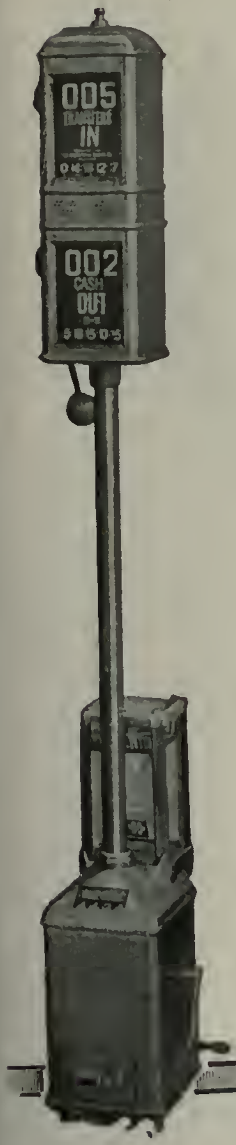
Position...

Your Fare Collection Problems—

IT matters not what fare you are charging, whether it be a single unit coin or odd cents or either combined with a metal ticket, there is an International Coin Register or Fare Box that will simplify its handling with a minimum amount of manual effort, will protect your earnings and aid in the accounting.

International fare collection devices have been the general standard throughout the country for many years and its experts have kept pace with the times in the development of International devices to best meet changing conditions and reach nearest to the ideal method of fare collection.

International machines have been adapted to take care of the new 6c., 7c. and 8c. fares, whether alone or in connection with the use of metal tickets. Because of our specializing for so many years in the manufacture of fare collection devices we believe that through our long experience in this field we are in the best position to suggest proper equipment. It is not at present possible to standardize so long as fare changes are so frequent and different rates of fare and conditions so varied. We ask the opportunity to study your problems and devise a solution if what we now have does not fully meet your requirements.



Type C20 Coin Metal Ticket and Transfer Register

Ticket Side Type C17 Coin and Metal Ticket Fare Box

Cash Side Type C17 Coin and Metal Ticket Fare Box

**Information gladly given—
no obligation.**

THE INTERNATIONAL
REGISTER COMPANY
15 South Throop Street, Chicago, Ill.

"We installed twenty-five of the Johnson Fare Boxes in the cars on our city lines December, 1916, and they have been in constant use since.

"They have rendered very satisfactory service and have given very little mechanical trouble. The continuation of their use in service on our lines is our best recommendation as to their merit."

CHICAGO AND JOLIET RAILWAY CO.

"The Johnson Fare Boxes are used on a number of our trunk lines with satisfactory results. The writer was for many years identified with the ——————, during which time he had occasion to try out several types of fare boxes with the result that we finally adopted the Johnson Fare Box as standard for the system.

"In view of the good results obtained from the use of the Johnson Fare Box, it is the intention of this company to ultimately so equip all of the cars on this system."

NEW ORLEANS RAILWAY & LIGHT CO.

"We have 345 Johnson Fare Boxes in service. They have proven very satisfactory because they have not slowed up operation, they have lessened accidents, they have promoted a clean-cut business-like method of collecting fares, and finally, we get the money."

THE DENVER TRAMWAY COMPANY.

"We have 208 Johnson Fare Boxes in service, a number of which have been in service two years. We have yet to find a cause for complaint."

THE CONNECTICUT COMPANY.

"Johnson Fare Boxes make good"—

is the substance of all their opinions

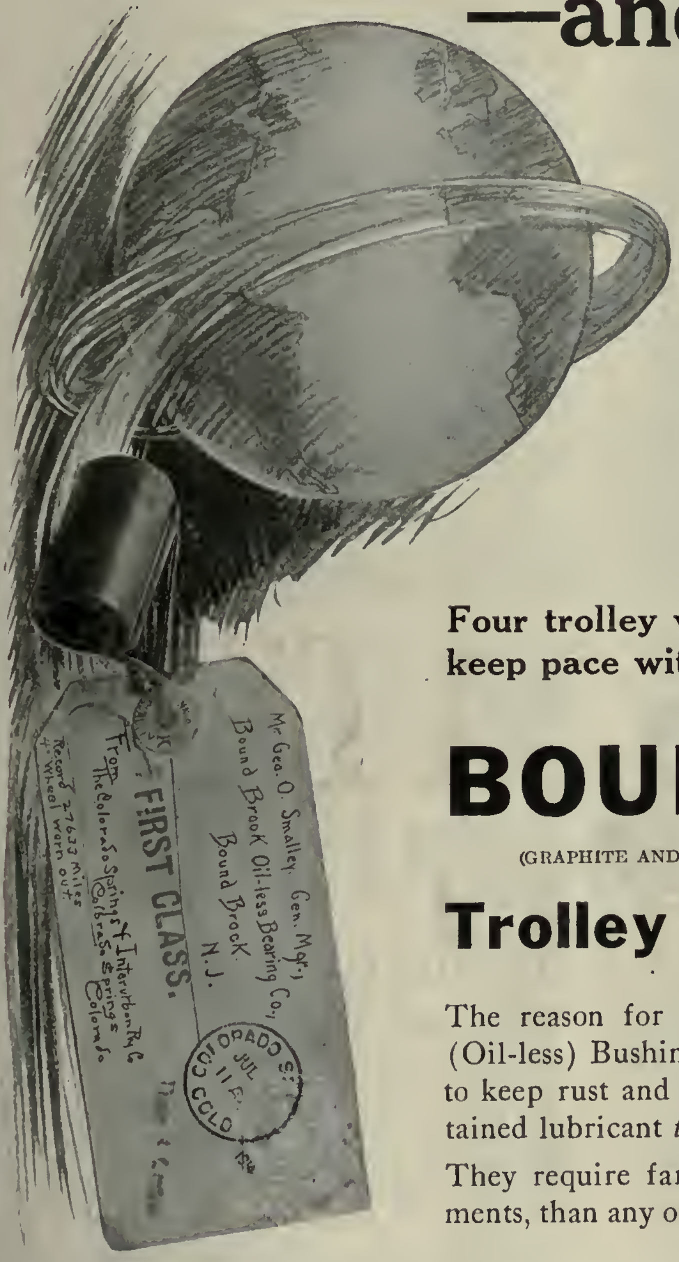
Johnson Fare Box Company

Jackson Boulevard and Robey St., Chicago

50 East 42nd Street, New York

Around the Earth

—and then some



This Bound Brook Trolley Wheel Bushing traveled 27,633 miles in actual service before it was mailed back to us for inspection. Little evidence of wear could be found.

Four trolley wheels were worn out trying to keep pace with this one little piece of metal.

BOUND BROOK

(GRAPHITE AND BRONZE. TRADE MARK REG. U. S. PAT. OFF.)

Trolley Wheel Bushings

The reason for the long service-life of Bound Brook (Oil-less) Bushings is their ability to function properly—to keep rust and friction away—by means of a self-contained lubricant *that never gives out.*

They require far less attention, and far fewer replacements, than any other type of bushing.

All Genuine Graphited Oil-less Bushings have always been made at Bound Brook, U. S. A.

BOUND BROOK OIL-LESS BEARING CO.

"Specialists in the manufacture of Oil-less Bushings for more than a third of a century."

BOUND BROOK, NEW JERSEY

COSMIC
METAL BEARINGS
Prevent Hot Boxes—Eliminate Babbitting

If we fail to eliminate your Bearing Troubles, no matter how chronic, we make no charge.

Cosmic Metal bearings for armature, axle or motor are made exceptionally strong and tough, to give long life and a slow, even rate of wear. Under actual working conditions and tests they have proved far more dependable than bearings made of other metals.

They have sufficient strength to carry any load and are easily lubricated. If, through accident or other cause, they should not be properly lubricated, they will continue to run *without injuring the machinery* until attended to.

This is a very important point, because ordinary bearings which are improperly lubricated, or hard to lubricate, will generate intense heat. This rapidly causes the bearing to melt, or to fuse and stick, causing serious and costly damage to machinery.

Bearings made of Cosmic Metal will not stick or grab the shaft or axle, even though lubrication does not reach them. They prevent hot boxes with their resultant accidents, and in the end are a much safer and more economical equipment than any other bearing. Let us send further information.

COSMIC METAL COMPANY
420 Walnut Street, Philadelphia

Where they're busy
they're
Boyerized

Tampa, Fla., isn't such a big town, maybe, but they have pretty lively business there—

Particularly since the safety car came.

At Tampa now the word "Safety" means SAFETY in every respect. Which accounts for their use of Boyerized Brake Pins and Bushings for all brake rigging—particularly to overcome the grinding action of fine sand on ordinary materials.

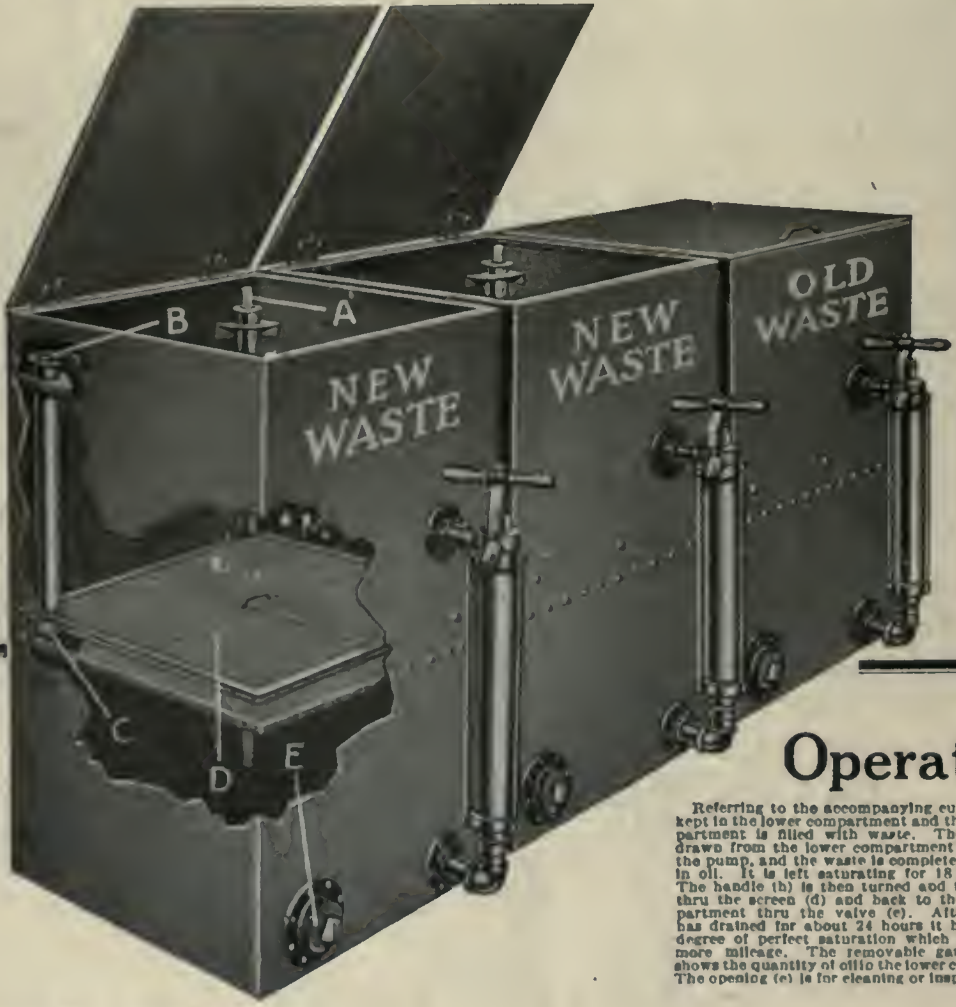
"My, what troubles we had without them."

Do what's necessary to be able to say the same!

ELECTRIC RAILWAY SUPPLIES
Bemis Car Truck Company
SPRINGFIELD, MASS.

Bemis Trucks
Case Hardened Brake Pins
Case Hardened Bushings
Case Hardened Nuts and Bolts
Manganese Brake Heads
Manganese Transom Plates
Manganese Body Bushings
Bronze Axle Bearings

Greatly Increased Mileage from each Journal Box Packing



Operation

Referring to the accompanying cut. The oil is kept in the lower compartment and the upper compartment is filled with waste. The oil is then drawn from the lower compartment by means of the pump, and the waste is completely submerged in oil. It is left saturating for 18 or 24 hours. The handle (h) is then turned and the oil drains thru the screen (d) and back to the lower compartment thru the valve (e). After the waste has drained for about 24 hours it has reached a degree of perfect saturation which means 100% more mileage. The removable gauge stick (a) shows the quantity of oil in the lower compartment. The opening (c) is for cleaning or inspection.

By using the Milwaukee Waste Saturation System

you can avoid the troublesome and costly hot box and realize 10 to 15 thousand miles on a single journal box packing, at a substantial saving of oil.

Constant lubrication is assured by the method of saturating the waste. Thorough lubrication makes possible a saving of at least one-third on journal box maintenance.

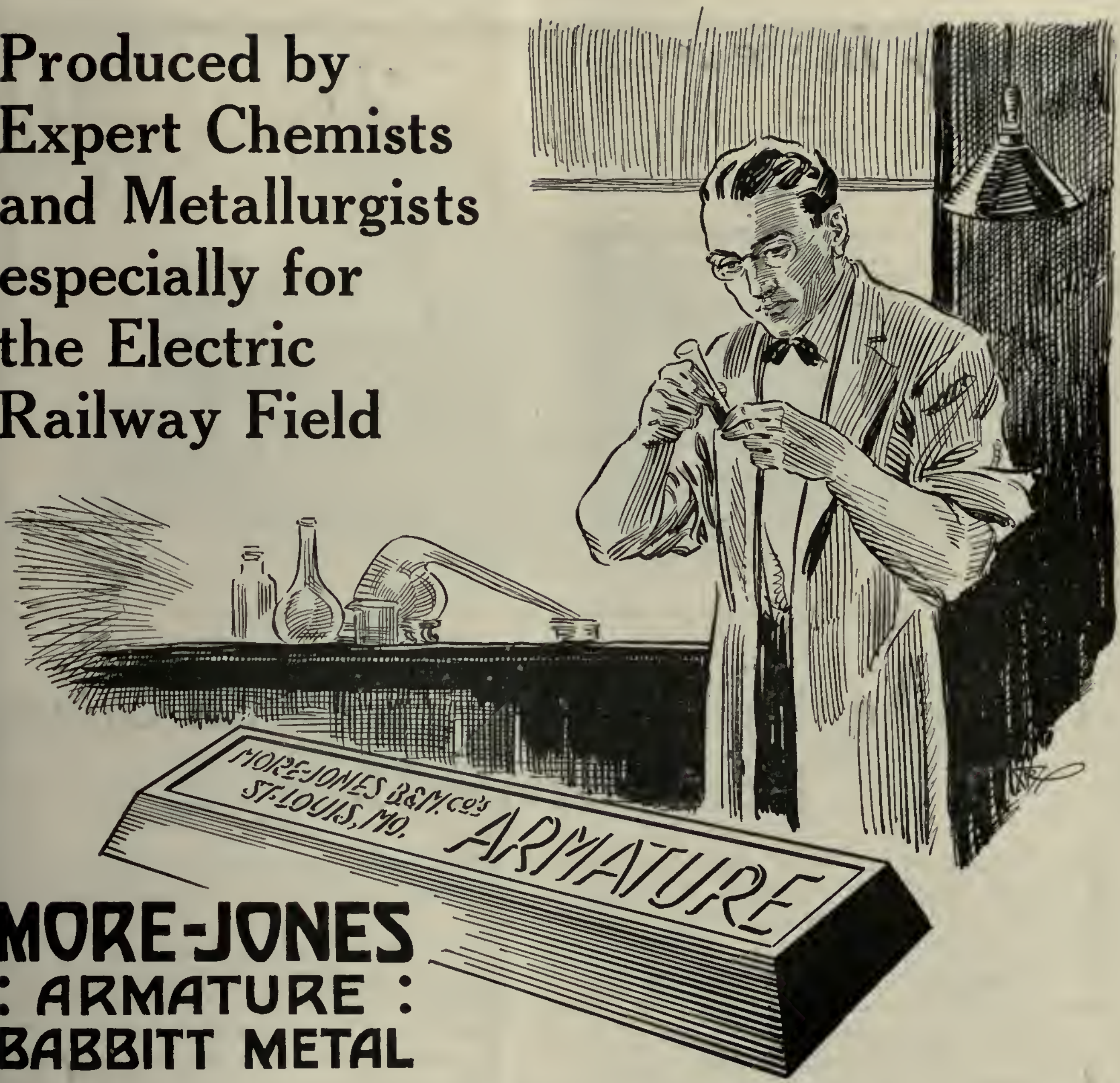
Milwaukee Outfits Cut Your Oil and Labor Expense

We manufacture 30 different types of outfits for the economical storage and handling of such liquids as machine oils, cutting oils, kerosene, gasoline, etc. A Milwaukee Outfit will save you from 5 to 10 gallons of liquid on every barrel you use.

Write for our catalog of complete oil storage systems for Railways.

Milwaukee Tank Works
Milwaukee, Wisconsin

Produced by Expert Chemists and Metallurgists especially for the Electric Railway Field

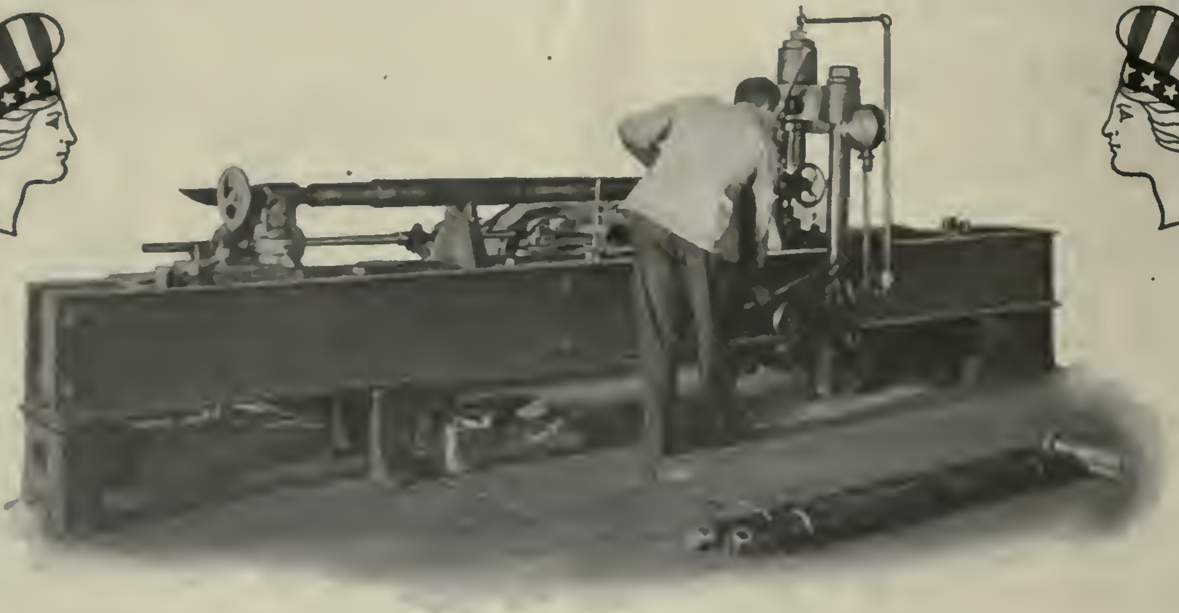


MORE-JONES
: ARMATURE :
BABBITT METAL

So vital is the need today, for the utmost economy in every detail of Electric Railway Operation that every resource of science and invention is called upon to help keep down costs. The value of the *specialized product* is recognized by the keenest executives. Such a product is More-Jones Armature Babbitt Metal. Years ago "practical" men might have laughed at the idea of expert chemists and metallurgists being called upon to produce a bearing metal. Today the recognition that a poor bearing metal can cause frequent renewals, lay up cars, reduce revenue and strain public relations makes men recognize the VALUE of *experience, research and tests* in producing a specialized metal. For Armature Bearing Service in the electric railway field IS exceptional. Ordinary babbitts cannot meet the peculiar conditions of temperature, strain, vibration and pounding. And any babbitt that is just strong, durable and low in friction will not give adequate service unless the metal is new and the treatment exactly correct. Hence this "specialist-produced" More-Jones Babbitt Metal. Its formula is a science, founded on forty years' experience in alloying metals under laboratory supervision. *It contains no trace of lead.* It is exactly worked out for its exact service. It is at least one-third lighter than lead-base babbitts and will go much further, pound for pound. Remelting over and over again causes no loss of efficiency and very little loss in weight. A majority of the leading electric railways use it. SERVICE has justified their selection.

More-Jones Brass & Metal Co.

St. Louis, U. S. A.



Columbia Axle Straightener in the Shop of the Third Ave. Railway System, New York

The Columbia Axle Straightener Is Giving Good Service Here

IN the shops of the Third Avenue Railway System, New York, just as it is in many other electric railway shops in the United States and elsewhere.

You ought to know all about the Columbia axle-straightener and then you'll order one sure. Here are the main facts:

Will straighten axles and shafts up to 6 in. diameter.

THE center heads remain in the same position, during the entire straightening process.

An inside spring in the center heads takes up the pressure at the ends of the shaft, avoiding the removal of the center points from the axle centers when straightening.

Operation is by means of hydraulic pressure.

And the Columbia Specialties listed below will also satisfy you.

Columbia Machine Works & Malleable Iron Co.

Atlantic Avenue and Chestnut Street, Brooklyn, N. Y.

TOOLS

- Armature and axle straighteners
- Armature shaft straighteners
- Armature buggies and stands
- Babbitting molds
- Banding and heading machines
- Car hoists
- Car replacers
- Coil taping machines for armature leads
- Coil winding machines
- Pinion pullers
- Pit jacks
- Signal or target switches
- Tension stands

W. R. Kerschner Co., Inc., N. Y.
Holden & White, Inc., Chicago
F. F. Bodler, San Francisco
Railway & Power Eng. Corp., Ltd., Toronto, Can.

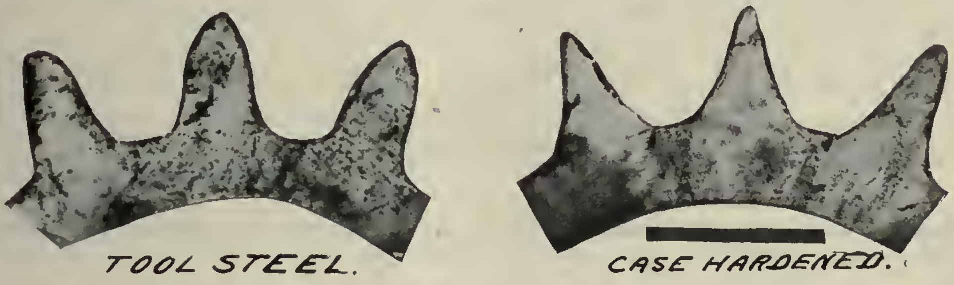
CAR EQUIPMENT

- Armature and axle bearings
- Armature and field coils
- Bearings (Axle and Armature)
- Brush-holders and brush-holder springs
- Brake, door and other handles
- Brake forgings, riggings, etc.
- Car trimmings
- Commutators
- Controller handles
- Forgings of all kinds
- Gear cases (steel or mall. iron)
- Grid resistors
- Third-rail shoe beams and accessories
- Trolley poles (steel) and wheels

Keeping Records Up to Date

(A test on an imitation pinion of the 1917 Class.)

The following shows a record of test on "Tool Steel" vs. a widely advertised pinion hardened by a case-hardening process—claimed to be "as good as Tool Steel"—selling for about the same price.



"Tool Steel" Pinion on Motor No. 1

Imitation Pinion on Motor No. 2

Same Car, Same Mileage, both started with new soft gears.

Ratio of Wear, 1 to 2.7 Favor "Tool Steel"

also

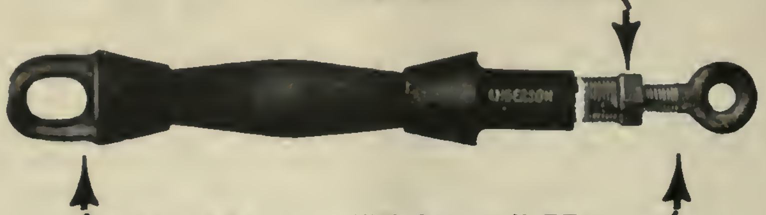
The imitation pinion caused its gear to wear considerably faster than the gear mated with "Tool Steel."

Have You Made Comparative Tests for Quality?

If you have, it's dollars to doughnuts you've standardized on our gears.

THE TOOL STEEL GEAR AND PINION CO.
CINCINNATI, OHIO

Typically Anderson!



One Turn Here

Doubles the "Take-up" Here

The rest of the Anderson Line is equally advantage

Every product in the Anderson line of specialties is the best that can be made.

Aetna Insulation, Trolley Bases, Harps and Wheels, Section Switches, Quick Break Switches, Cross-Overs, Frogs, Sanding Equipment.

The above strain has every merit of high-grade materials and construction, with the added advantage of the ingenious Anderson "double take-up." Write for details of other money, time and trouble-saving Anderson specialties.

ALBERT & J. M. ANDERSON MANUFACTURING CO.

289-293 A STREET, BOSTON, MASS., U. S. A.

NEW YORK
135 Broadway

PHILADELPHIA
420 Real Estate Trust Bldg.

CHICAGO
105 S. Dearborn St.
LONDON, E. C., 48 Milton St.

Look for the Name RIMCO

—if you want to save money

—look for the word RIMCO stamped on the *head of the plier and on the insulation.* It is an absolute *guarantee of protection* to both yourself and your men that these pliers will stand 10,000 volts and that the insulation will never crack, chip, break or become detached from the handle. It is assurance of greatest ultimate ECONOMY.

Rubber Insulated Metals Corp., Plainfield, N. J.

SALES AGENTS: Electric Service Supplies Co., 17th and Cambria Sts., Philadelphia. Canadian Agent: Lyman Tube & Supply Co., Ltd., Montreal, Toronto and Winnipeg

Exclusive Export Agents

International

Western Electric Company

White's Porcelain Trolley Hanger

is more easily installed and more satisfactory in service

The insulator, stud and yoke are separable, yet they assemble as a unit. When the trolley ear is attached and screwed up firmly on the stud, it can be twisted around at right angles to the span wire without loosening the ear on the stud.

The head of the stud is countersunk into insulator so it can't turn after the ear is set in proper alignment.

The insulator is made of durable glazed porcelain. The yoke is galvanized iron, the stud sherardized steel, or bronze bolts can be used instead of steel.

White's Porcelain Hanger is extremely durable, safe and low in cost, and WE CAN SHIP AT ONCE.

T. C. WHITE ELECTRICAL SUPPLY CO.
1122 PINE STREET, ST. LOUIS, MO.

There is a good story about Kipling

A friend sent him a copy of a magazine with the advertising pages torn out. Kipling wrote back: "Send me the ads next time. I can write stories myself."

This reminds us of a concern in Pennsylvania that subscribes to four McGraw-Hill papers just for the *Searchlight* ads.

Do you read the *Searchlight Section* each week? If not, you are passing up a great opportunity. These ads are the news of the machinery industry—a true barometer of conditions—and some of them may be published just for *your* benefit. Be sure and look them over *every week*. Start *now!*

Read the Searchlight Section in this issue

0014

If you are doing track construction or—reconstruction work why not *reduce the cost?*

You can reduce the cost with

DIFFERENTIAL ELECTRIC DUMPING CARS

You can load your ballast and paving material with fewer men and eliminate entirely labor cost in unloading same by the use of Differential Electric Dumping Cars. Saving in labor cost alone will practically return investment in one year.

Material may be unloaded clear of track by crew only without inconveniencing or delaying passenger traffic.

Used by city and interurban roads.

Write for full information.

DIFFERENTIAL CAR COMPANY, INC.

141 Broadway, New York

TRAM THE FIRST SHOT

Ninety per cent. of Car Replacements fail on first trial because the wheel flange shifts the replacer and lets the tread of the wheel drop below the head of the rail. By using this clamp which grips the replacer against the rail the wheel will tram the first shot.

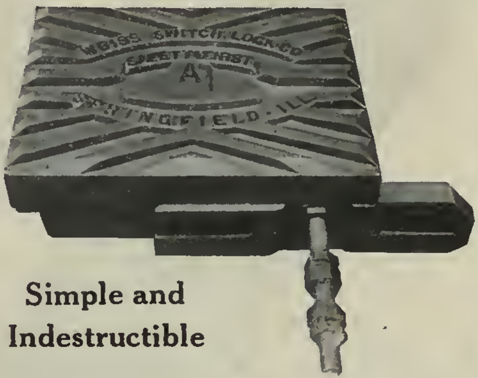
Manufactured and Sold by

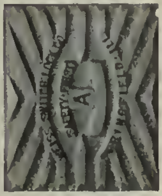
The Reading Specialties Company

Reading, Pa.

WEISS SWITCH LOCK

No More Split Switches





Watertight
Non-Freezable
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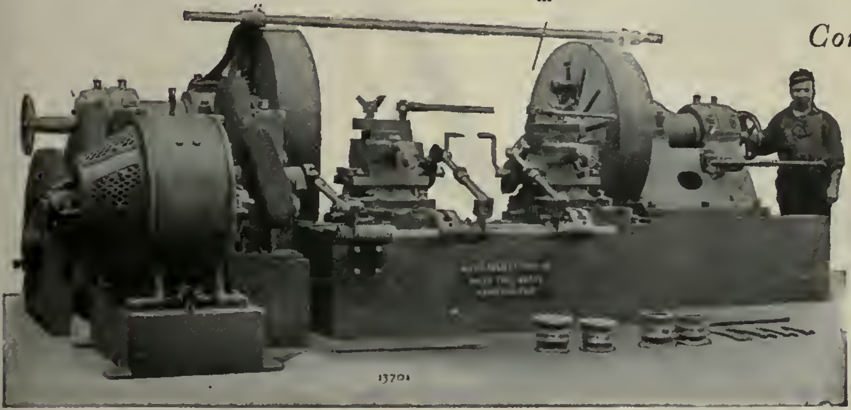

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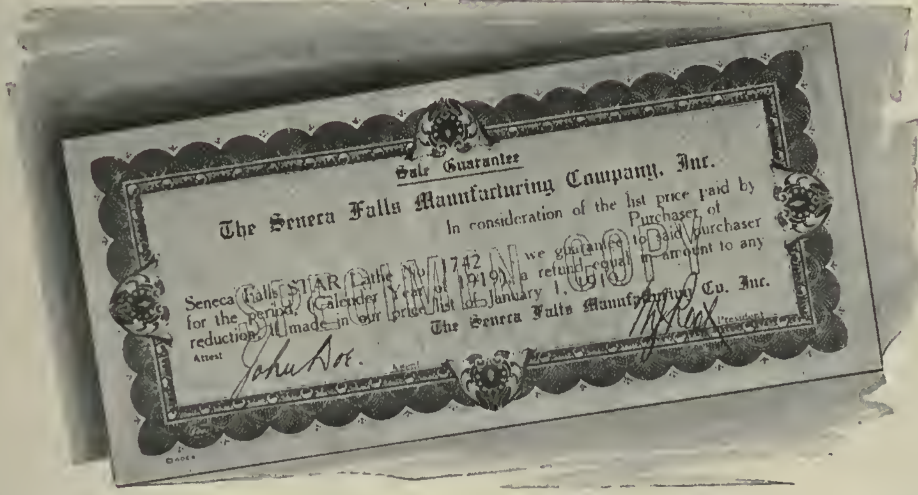

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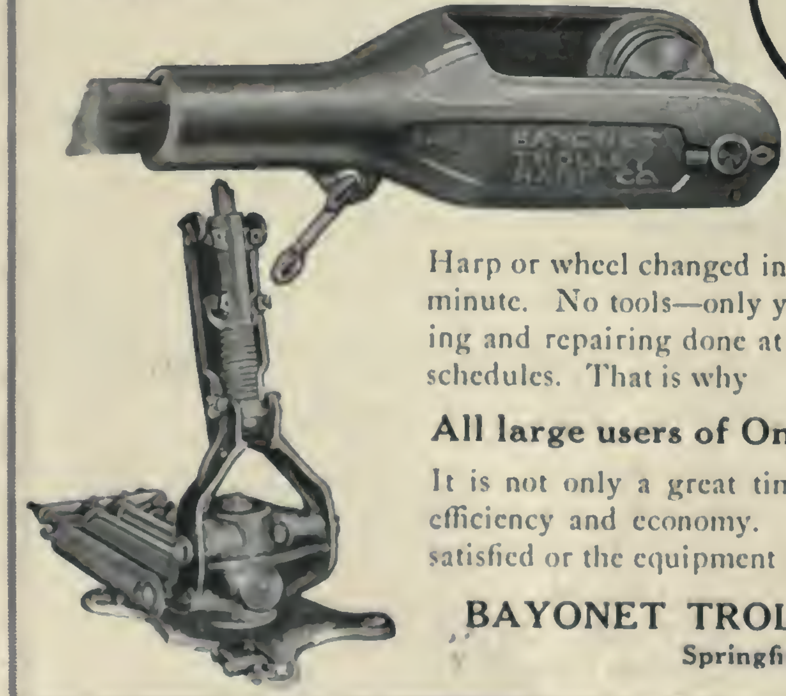

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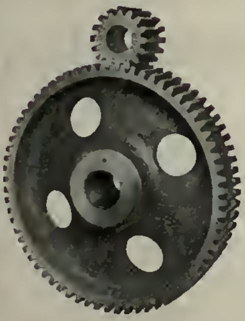

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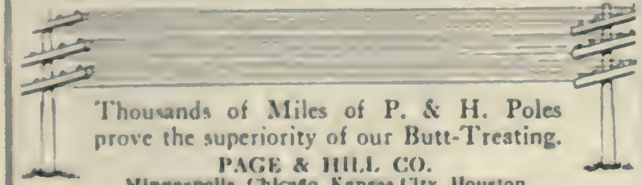

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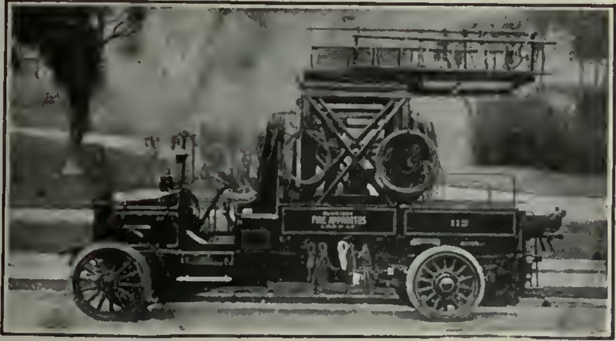

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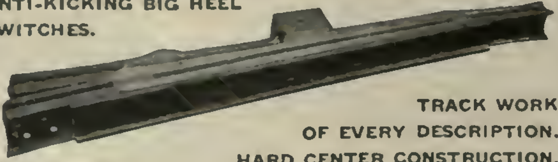

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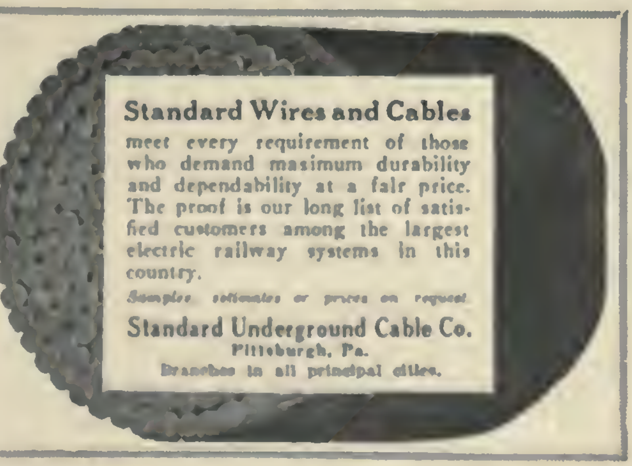

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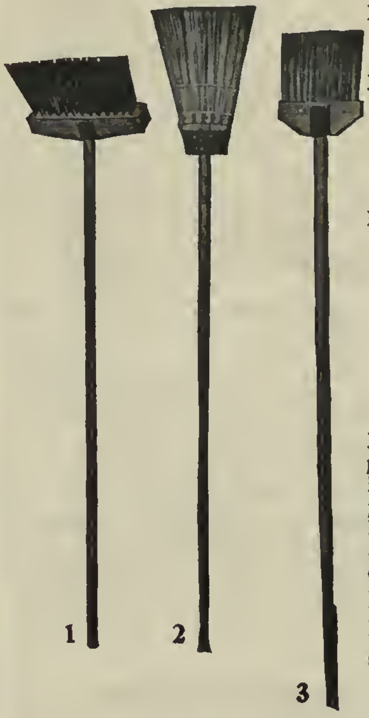

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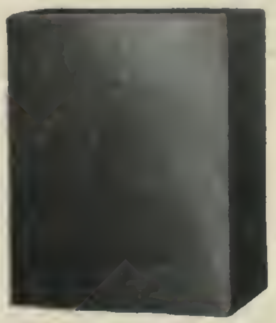

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542 So. Dearborn Street Chicago
Works: Schenectady, N. Y.

Williams' "Vulcan" Drop-Forged *Safety* Lathe Dogs

WE have an unusually good strain of dogs. Demands of high-speed-cutting have been consistently met. Dogs with bent tails; Dogs with straight tails; Dogs with flat tails; Dogs with one screw; Dogs with two screws—all with same unsurpassed merit and strength.

Sixteen sizes—⅜ to 6-inch capacities. *Machinists' Tools Booklet on request.*

J. H. WILLIAMS & CO.
"The Drop-Forging People"

Chicago Office
and Warehouse:
143 So. Clinton St.

General Office:
143 Richards St.
Brooklyn, N. Y.

IMPERIAL WELDING AND CUTTING EQUIPMENT
OXY-ACETYLENE PROCESS
QUALITY

Welds everything in metal—cuts anything in steel or wrought iron. Excels in Speed, Safety, Efficiency and Economy. Write for Free Catalog.
The Imperial Brass Mfg. Co., 525 S. Racine Ave., Chicago

FORD TRIBLOC

A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only Block that carries a five-year guarantee.

FORD CHAIN BLOCK & MFG. CO.
Second and Diamond Sts., Philadelphia

M-R INSULATION MFG CO

"Everything in Insulation"

Mica	Waxes
Vulcanized Fibre	Asphalts
Varnished Cloth	Compounds
Insulating Tapes	Insulating Varnish

The above are only a few of our products
Write us for anything in this line you may require.
MITCHELL-RAND M'F'G CO.
103 John St., New York City

Aladdin's Lamp
has nothing on the
"Searchlight"

When an advertiser sells equipment for over $4,000.00 through "Searchlight" advertising that cost $12.00, we think "Searchlight" is at least entitled to "favorable mention."

Searchlight Section
Employment — Equipment — Business Opportunities

615

MICA

India, Domestic, Amber
Cut to any size
shape or pattern

TAPES

White Cotton
White Muslin
White Linen

Write for Samples and Prices

A. O. SCHOONMAKER CO., 88 Park Place, New York

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co.
Ansonia, Connecticut

7233

P & B Insulation

guarantees good electrical service. Electric railway men have been buying P & B Products for 34 years—good evidence of quality.

Weatherproof Tape
Insulating Compound
Baking Varnishes
Air-Drying Varnishes
Solid Compounds

Write for Booklets

The Standard Paint Company
Woolworth Building, New York
Boston Chicago

SERVICE
SAFETY
and
ACCURACY

Insured through use of "KANT-SLIP" Interurban Train Dispatcher Register Systems

The
STANDARD REGISTER COMPANY
DAYTON, OHIO

Write for booklet

This File Reduces Commutator Slotting Costs

The HANDY Commutator Slotting File offers the quickest and cheapest method for under-cutting mica. Especially designed for this work and has a slotter on each end. It makes a "V" slot and will not tear holes in the mica.

Write for price list TODAY. Ask for data on Handy Commutator Stones for cleaning commutators and keeping them true.

THE HANDY SUPPLY CO.,
11737 Detroit Ave., Cleveland, Ohio

When you want Men

put your advertising for them on the same basis as other publicity.

If you want competent and efficient assistants, experienced in the field served by this journal, you will naturally find such men among our readers—which include the keenest and most progressive men in the industry.

Get in touch with a number of these men and select the one that is best suited for your needs.

Only $1.50 *for* 30 *words*

806

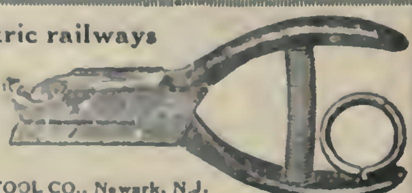
Simplex Jacks
for
Railroads-Contractors-Industries
Automobiles-Pole Pulling and Ordnance

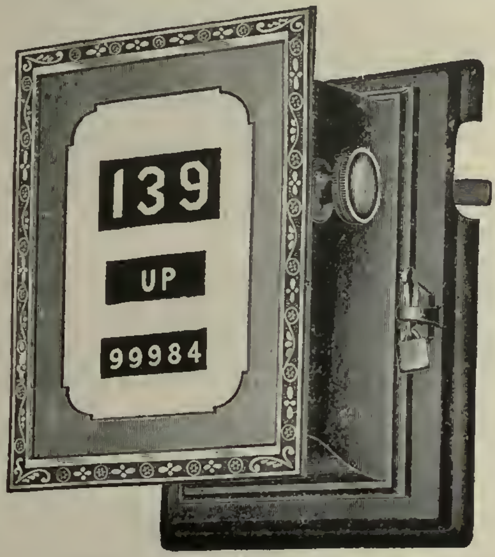
Templeton, Kenly & Co., Ltd.
[illegible]
London Chicago Paris

75% of the electric railways
use
B-V Punches

Send for Catalog.

BONNEY-VEHSLAGE TOOL CO., Newark, N.J.





Fare Registers

Repair Parts for Registers.

Repairing at Short Notice.

EXELL MANUFACTURING CO.
NEW HAVEN, CONN.

Smith-Ward Brake Slack Adjusters

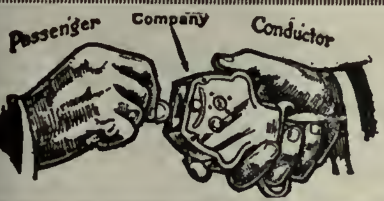
Promote Braking Safety

Under normal conditions where brake rigging is set up S-W- B Adjusters work practically 100% efficiently, and when your cars are equipped with them there are no "ifs" about their operation. They are "safe" all the time. Hundreds of cars equipped with our adjusters now in daily operation are proofs of that statement.

Can you say that of any other Adjuster?

Smith-Ward Brake Co.
Bush Terminal Bldg. No. 1
233 Thirty-Seventh St., Brooklyn, N. Y.

The Economy Railway Meter
Induces
Power Saving.
Our power-saving bulletins will vitally interest you right now. Ask for them.
Economy Electric Devices Co., Chicago



Direct Automatic Registration By the Passenger
Rooke Automatic Register Co.
Providence, R. I.

You will buy
CLEVELAND
Fare Boxes
Eventually—
Why not now?
Cleveland Fare Box Co.
CLEVELAND, OHIO

Use them in your terminals—
PEREY TURNSTILES
or PASSIMETERS
Faster than the ticket seller
Perey Manufacturing Co., Inc.
30 Church Street, New York City

Heating and Ventilating
Let us demonstrate to you how we can heat and ventilate your cars at the lowest possible cost
The Cooper Heater Company
Carlisle, Pa.

When writing to Advertisers in this publication you will confer a favor on both publisher and advertiser by mentioning the Electric Railway Journal

Bonham Traffic Recorders
Show origin and destination of every fare collected as well as other valuable traffic data.
The Bonham Recorder Co., Hamilton, O.

Bare and Magnet Wire
(Round, Square and Flat)
For
Field and Armature Coils
We manufacture

Bare and tinned copper wire for all electrical purposes, and also cotton, silk and enameled magnet wire, rubber insulated car wires, N.E.C.S. rubber covered wires and flexible cords.

Will gladly quote on these as well as bare copper power cables, solid or stranded.

Make use of our unusual facilities.

ROME WIRE COMPANY
Rome, N. Y.

STUCKI
SIDE BEARINGS

have neither springs nor axles nor levers nor other delicate parts.

Simply a cage and one roller made of Tropenas steel. Roller is eccentrically loaded.

A. STUCKI CO.
Oliver Building, Pittsburgh, Pa.

WE CAN CUT YOUR COST OF
HEATING CURRENT
Write for THERMOSTATIC CONTROL INFORMATION

GOLD

ELECTRIC HEATERS Cut Installation and Maintenance Charge.
VENTILATORS Also Ventilate in Stormy Weather.
THERMOSTATS Save Current.
ORIGINATED the use of NON-CORROSIVE Wire for Electric Car Heaters.
ORIGINATED The Ventilated Coil Support.

LET US FIGURE ON YOUR NEXT REQUIREMENTS
Gold Car Heating & Lighting Co., 17 Battery Pl., New York

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.

THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

Electric car heaters—thermostatic control—pneumatic car door operators—buzzers, single-stroke bells, starting signal lights—special resistances.
CONSOLIDATED CAR HEATING CO.
ALBANY, NEW YORK, CHICAGO

FUEL CONSERVATION

is a necessity and the heating and ventilating of street cars should be accomplished the most economical way. Our Hot Air Forced Ventilation Equipment combines heat with ventilation at a saving of 50% to 70% over electric heat.
THE PETER SMITH HEATER CO. DETROIT, MICH.

It Pays to carry an advertisement in the ELECTRIC RAILWAY JOURNAL every issue of the year because you obtain proportionately better Results

MASON SAFETY TREAD—Lead or carborundum filled, non-slippery; prevents accidents, cuts out damage suits.
KARBOLITH CAR FLOORING—For steel cars; is sanitary, light weight fire proof, non-slippery.
STANWOOD STEPS—Self-cleaning, non-slippery, light.
Over six million feet used without accident being reported within the knowledge of manufacturer.
Our products used on all leading railroads on cars and stations. For details address
AMERICAN MASON SAFETY TREAD CO., Lowell, Mass.
Branch Offices: Boston, New York City, Philadelphia.
Agencies in all principal cities.

Le Carbone
Carbon Brushes are
uniform. They talk
for themselves.

W. J. Jeandron
173 Fulton Street
New York City

Pittsburgh Office:
636 Wabash Building

Canadian Distributors:
Lyman Tube & Supply Co., Ltd.
Montreal and Toronto

BRAKE SHOE
STANDARDS

SAVE MATERIAL
SAVE LABOR
SAVE TIME
SAVE MONEY

Ask Us?

American Brake Shoe & Foundry Co.
30 Church Street, New York
McCormick Bldg., Chicago Chattanooga, Tenn.

Why Does a Great Interurban System Carry This Harp and Wheel on Their Locomotives?

Because it does away
with resistance under
heavy load conditions.

"The Harp with the big Contact Spring."

**The Holland
Trolley Supply Co.**
1623 East 43rd St.
Cleveland, O.

WITH absolute sincerity we make the statement that AJAX BULL BABBITT is
Physically and Chemically the
Scientifically Correct Babbitt.
"Most dependable—Most economical."

THE AJAX METAL COMPANY *Established* 1880
Main Office and Works: Philadelphia, Pa.
Southern Plant: Birmingham, Ala.

Eight Hundred and Twenty-three Equipments of N L Indicating Tail-lights Sold During the Year 1918

2323 Cars now equipped and the motormen in Cleveland, Toledo, Philadelphia, Akron and St. Joseph say it is the best thing ever put on a car to promote safety and economy.

THE NICHOLS-LINTERN COMPANY, Cleveland, Ohio, U. S. A.

VAN DORN COUPLERS

are made for every condition and requirement. M. C. B. Pin and Link, Car and Air, in all sizes and types.

VAN DORN COUPLER CO.
2325 So. Paulina St., Chicago, Ill.

Replies to
"WANT" and "FOR SALE"
Advertisements

in the Searchlight Section of this paper may be keyed to our NEW YORK, PHILADELPHIA, CLEVELAND, CHICAGO, SALT LAKE CITY or SAN FRANCISCO offices, if preferred, and these replies will be mailed promptly each day to the advertisers

NEW YORK OFFICE: 10th Ave. at 36th Street
Philadelphia, 935 Real Estate Trust Bldg.
Cleveland, 657 Leader-News Bldg.
Chicago, 1144 Monadnock Block.
Salt Lake City, 1101 Newhouse Bldg.
San Francisco, 501 Rialto Bldg.

891

SEARCHLIGHT SECTION

Get Your Wants into the Searchlight

ADVERTISING RATES

Ads Set in Uniform Style

(Solid, in one paragraph, without display.)

THREE CENTS A WORD, minimum charge 50 cents an insertion, payable in advance, less 10 per cent. if one payment is made in advance for four continuous insertions—for advertisements under:

Positions Wanted
Evening Work Wanted
Vacation Work Wanted
Tutoring
Salesman Wants Connections

FIVE CENTS A WORD, minimum charge $1.50 an insertion, for advertisement under:

Agencies Wanted
Agents Wanted
Business Opportunities
Desk Room for Rent
Educational
Employment Agencies
Desk Room Wanted
Foreign Business
Positions Vacant
Partner Wanted
Representations Wanted
Salesmen Wanted
Patents for Sale
Plants for Sale
Sub-Contracts Wanted
Work Wanted

Miscellaneous for Sale, for Rent or Want Ads.

THIRTY CENTS A LINE, minimum five lines, for all undisplayed advertisements set with a paragraph for each item or tabulated

THREE DOLLARS AND SIXTY CENTS AN INCH for advertisements for bids (Official Proposals)

Ads Set in Display Type

(Individual space, within border rules.)

Space for these advertisements is sold by the inch. Each page contains 30 inches. The rate per inch is based on the *total* number of inches to be used—that is, the number of inches the advertisement is to occupy multiplied by the number of insertions it is to receive. For instance, a 2-inch advertisement in 2 issues earns the 4-inch rate of $2.90 an inch. A 1-inch space in 4 issues, or a 4-inch space in one issue, also earn the 4-inch rate.

SCHEDULE OF RATES

1 to 3 in.,	$3.00 an in.	15 to 26 in.,	$2.70 an in.
4 to 7 in.,	2.90 an in.	27 to 49 in.,	2.60 an in.
8 to 14 in.,	2.80 an in.	50 to 99 in.,	2.50 an in.

Rates for larger space furnished on request

> *For quick and satisfactory results tell the reader everything that he will want to know.*

INFORMATION

ALLOW FIVE WORDS for the address, if replies are to a box number in care of any of our offices. There is no extra charge for forwarding replies

IN REPLYING TO ADS, do not enclose original testimonials or anything that you may want returned. State your experience and qualifications in as concise and neat a manner as possible and enclose copies of your testimonials.

BE CAREFUL TO PUT ON ENVELOPE, when answering any "blind," ad, the box number in the ad, the name of the paper, and also the local address of office to which reply is sent:

36th St., at 10th Ave.,	New York
935 Real Estate Trust Bldg.,	Philadelphia
657 Leader-News Bldg.,	Cleveland
1570 Old Colony Bldg.,	Chicago
519 Newhouse Bldg.,	Salt Lake City
501 Rialto Bldg.,	San Francisco

WHEN ADVERTISING MACHINERY, use your own name and address—or a local address of some kind—so that the readers can wire direct and get quick replies. We advise also that you state in your advertisement the present location of plant that is offered for sale, or point of delivery provided you are in the market for equipment.

TO SIGN YOUR NAME and address to your advertisement begets the confidence of the reader and facilitates receiving replies. You can, however, obviate delay in receiving answers by signing your ad. only with initials (your own or others), care of your home, your office or a post-office box number in your city.

POSITIONS VACANT

CLERK wanted, experienced in electric railway accounting. State qualifications, experience and salary expected. Address A C Moore Auditor, N. O. T. & L. Co., Terminal Building, Akron, Ohio.

HIGH-GRADE master mechanic wanted for street railway system in Texas city of 25,000 P-342, Elec. Ry. Journal, Chicago.

THREE armature winders wanted Michigan Railway Co., Albion, Mich.

WANTED at once, an experienced car barn foreman for nights, on 1200 volt equipment State experience and wages wanted P-311, Elec Ry. Journal, Phila.

POSITIONS WANTED

ASSISTANT to chief engineer or general manager; 14 years' experience construction, operations, and engineering, general knowledge of mechanical, electrical transportation and accounting matters as related to way and structure department Technically trained. PW-340, Elec. Ry. Journal

ATTENTION—Street railway engineer over 10 years' experience, having been honorably discharged as major engineer U. S. Army after 20 months' service, desires to locate with growing concern where energy, strict application to duty and sound common sense methods are essentials. Have had considerable experience in revaluation work, heavy power house and building construction, power, installation and maintenance. Would consider management or organization. PW-336, Elec Ry Journal

POSITIONS WANTED

FARE expert. Army captain, formerly assistant to president of well known city railway, wants position as executive or assistant. Is expert on fare and traffic problems. Best references furnished. Salary $3500 to $4000. Address PW-338, Elec. Ry. Journal.

AGENTS AND SALESMEN

Electrical Supply Salesman Wanted
With several years' experience (both in purchase and sales preferred) who commands a wide Chicago acquaintance, and an established trade can better his position by addressing fully. AS-333, Elec. Ry. Journal, Chicago.

Do You Wish Representation in Italy?
Civil engineer wishes to represent American firm. Best references. F. Zucchi, 70 Via Moscova, Milan, Italy.

FOR SALE

Sale of Government Owned Transformers
Bids will be opened at 10 A. M. March 5, 1919, for any and all of 40 three-phase Transformers 2300, 2400, 2500—200, 210, 220 volts, Wagner Electric Co., manufacturers. F.O.B. cars, located in Zone Supply Office, St. Louis, Mo ; 5-50 kva., 5-25 kva., 10-15 kva., 10-10 kva., 10-5 kva Bids to be on special forms, which with particulars can be obtained upon application to War Department, Surplus Property Div., Munitions Bldg., Washington, D C. Refer to S P D No. 321 M. E.

Your Advancement

is largely in your own hands—it is doubtful if anyone else is worrying over it

Better positions are constantly being secured through small advertisements in the "Positions Wanted Columns."

60 cents for 20 words

IMMEDIATE DELIVERY

Five new P.A.Y.E. double truck cars. Length, 45-ft. Equipped with 4GE Co.'s 247 Motors and G. E. Co. Air Brakes.

McGUIRE-CUMMINGS MANUFACTURING CO.
Cars and Trucks, Snow Sweepers, Electric Locomotives
111 West Monroe Street, Chicago, Ill.

ROTARY CONVERTERS

1—300-kw. Westinghouse Rotary Converter, 3-ph., 60-cy., 370-v. A.C., 575-v. D.C., 600 r.p.m.
1—200-kw. Westinghouse Rotary Converter, 3-ph., 60-cy., 370-v. A.C., 575-v. D.C.
1—150-kw. Westinghouse Rotary Converter, 2 or 3-ph., 60-cy., 250-v. D.C., 720 r.p.m.

TURBINE

1—500-kw. Westg. Horizontal, 3-ph., 60-cy., 370-v. (can be rewound for any standard voltage), 3600 r.p.m., with or without condensing equipment.

ARCHER & BALDWIN, INC.
114-118 Liberty St., New York, N. Y.
Telephone 4337-4338 *Rector*

S EARCHLIGHT
S ERVICE
S ECURES
S ATISFACTORY
S ITUATIONS
S ALES

816

WATER TUBE BOILERS

2—981 hp. Edge Moor, 235 lb. pressure.
1—450 hp. Heine, 170 lb. pressure.
4—400 hp. Stirling, 150 lb. pressure.
1—380 hp. Stirling, 150 lb. pressure.
2—360 hp. Erie City, 160 lb. pressure.
1—310 hp. Stirling, 200 lb. pressure.
6—308 hp. Heine, 140 lb. pressure.
1—305 hp. Babcock & Wilcox, 160 lb. pressure.
12—264 hp. Babcock & Wilcox, 175 lb. pressure.
8—250 hp. Stirling, 160 lb. pressure.
1—212 hp. Babcock & Wilcox, 160 lb. pressure.
2—204 hp. Babcock & Wilcox, 160 lb. pressure.

MacGovern & Company, Inc.
114 Liberty St., New York, N. Y.
Pittsburgh Office: 498 Union Arcade Bldg.

CLEVELAND ARMATURE WORKS
Incorporated
Cleveland, Ohio

Everything in the Line of Repairs to Electrical Machinery

Complete Armatures, New Armatures, Rewound Armature Cores, Armature Shafts, Armature Coils, Fields and Commutators.

Established 22 Years

RATES:

1 inch—$3.00
4 inches—$2.90 an inch

(The above rate applies to a 4-inch space in one issue, a 2-inch space in two issues, or a 1-inch space in four issues. The larger spaces following may be used up in a similar way).

8 inches—$2.80 an inch
15 inches— 2.70 an inch
27 inches— 2.60 an inch
50 inches 2.55 an inch

Rates for larger spaces furnished on application.

NEW RAILS

700 tons 100-lb.
600 tons 85-lb.
500 tons 90-lb.

Switch Turnouts

8—70-lb. ASCE, and frog. Manganese. New.
1—60-lb. ARA-A 4½ L. H. Good as new.
1500 kegs $\frac{9}{16}$ x 5½ in. "Zelnicker Selected" Used Spikes.
300 kegs, $\frac{9}{16}$ x 5 x 5½ in. New Spikes.

Track Accessaries all kinds, prompt shipment.

ZELNICKER IN ST. LOUIS
Get Bulletin 250 — A Big Money Saver.

FOR SALE

12—Westinghouse 112-B (65 hp.)

RAILWAY MOTORS

Excellent condition. Very low price.

TRANSIT EQUIPMENT COMPANY
501 Fifth Ave., New York

Cars For Sale

12 Double Truck Motor or Trailers. Brill 27-F trucks, 28-ft. closed bodies.

3 SNOW PLOWS

2 single, 1 double truck

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa

RAILS

15,000 TONS—NEW and RELAYERS
NEW—12 lb., 16 lb., 20 lb., 25 lb., 30 lb. 40 lb., 60 lb., 70 lb., 75 lb., 80 lb., 85 lb., 90 lb.
RELAYERS—30 lb., 35 lb., 40 lb., 45 lb. 56 lb., 60 lb., 70 lb., 80 lb., 85 lb., 90 lb., 100 lb.

Fastenings, New Bolts, Nuts and Spikes. New Frogs, Switches, Crossings and all accessories. Carload and less carload inquiries and orders a specialty. Rails cut to lengths for structural purposes. Attractive prices. Immediate shipments from stock.

L. B. FOSTER COMPANY
Park Bldg., Pittsburgh, Pa.

Keep Your Eye on the "Searchlight"
and your advertisements in it.

FOR SALE

MOTORS

10—Westinghouse 68 C individual, less gears, pinions and gear cases, but all bearings if desired. In good mechanical and electrical running order. **Also 15 K 11 A controllers.**

Good condition

Address W. H. SMAW, *Pur. Agt.*
Georgia Ry. & Power Co., Atlanta, Ga

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Acetylene Service Apparatus
Oxweld Acetylene Co.

Advertising, Street Car
Collier, Inc., Barron G.

Air Pressure Relays
Philadelphia Electric
Company Supply Dept.

Air Rectifiers
Holden & White, Inc.

Amusement Devices
Este Co., The J. D.

Anchors, Guy
Electric Service Supplies Co.
Holden & White, Inc.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Ash Storage Tanks, Cast Iron
Green Engineering Co.

Automobiles and Buses
Brill Co., The J. G.

Axle Straighteners
Columbia M. W. & M. I. Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
National Railway Appliance Co.
St. Louis Car Co.
Standard Steel Works Co.
Westinghouse Elec. & M. Co.

Babbitting Devices
Columbia M. W. & M. I. Co.

Babbitt Metal
Ajax Metal Co.

Badges and Buttons
Electric Service Supplies Co.
International Register Co., The

Batteries, Dry
Nichols-Lintern Co.

Batteries, Storage
Electric Storage Battery Co.

Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Cosmic Metal Co.
Eureka Co.
General Electric Co.
More-Jones Brass & Metal Co.
St. Louis Car Co.
Westinghouse Elec. & M. Co.

Bearings, Center and Roller Side
Holden & White, Inc.
Stucki Co., A

Bearings, Oilless, Graphite & Bronze
Bound Brook Oilless Bearing Co.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail
Niles-Bement-Pond Co.
Reading Specialties Co.
Zelnicker, Walter A., Supply Co., Inc.

Boilers
Babcock & Wilcox Co.

Boiler Tubes
National Tube Co.

Bond Testers
American Steel & Wire Co.
Lincoln Bonding Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Service Supplies Co.
Imperial Brass Mfg. Co.
Lincoln Bonding Co.
Ohio Brass Co.
Oxweld Acetylene Co.

Bonds, Rail
American Steel & Wire Co.
Electric Service Supplies Co.
General Electric Co.
Lincoln Bonding Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Book Publishers
McGraw-Hill Bk. Co.

Boring Tools, Car Wheel
Niles-Bement-Pond Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
Bates Expanded Steel Truss Co.
Hubbard & Co.
Lindsley Bros. Co.
Ohio Brass Co.

Brake Adjusters
Holden & White, Inc.
Smith Ward Brake Co.
Westinghouse Traction Brake Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Holden & White, Inc.
National Brake Co.
St. Louis Car. Co.
Safety Car Devices Co.
Westinghouse Trac. B. Co.

Brick, Fire
Green Engineering Co.

Brooms, Track, Steel or Rattan
Paxson & Co., J. M.
Zelnicker, Walter A., Supply Co., Inc.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Morgan Crucible Co.
United States Graphite Co.
Westinghouse Elec. & M. Co.

Brushes, Graphite
United States Graphite Co.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.

Buckets
Blaw-Knox Company

Bushings, Case Hardened & Manganese
Bemis Car Truck Co.

Bushings, Graphite & Wooden
Bound Brook Oilless Bearing Co.

Cable End Bells
Philadelphia Electric
Company Supply Dept.

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.)

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc.—See those headings.)

Car Trimmings. (For Curtains, Registers, Doors, Seats, etc.—See those headings.)

Car Panel Safety Switches
Westinghouse Elec. & Mfg. Co.

Cars, Dump
Differential Car Co.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.

Cars, Section
Mudge & Co.

Cars, Self-Propelled
Electric Storage Battery Co.
General Electric Co.

Castings, Brass, Composition or Copper
Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.
More-Jones Brass & Metal Co.

Castings, Gray Iron and Steel
American Steel Foundries
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.
Standard Steel Works Co.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Catchers and Retrievers, Trolley
Earll, C. I.
Electric Service Supplies Co.
Holden & White, Inc.
Ohio Brass Co.
Wood Co., Chas. N.

Circuit Breakers
The Cutter Electrical & Mfg. Co.
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Westinghouse Elec. & Mfg. Co.

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Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Clamps, Insulator
Philadelphia Electric
Company Supply Dept.

Cleaners and Scrapers Track—(See also Snow-Plows, Sweepers and Brooms.)
Brill Co., The J. G.
Ohio Brass Co.

Cleat Type Switchboard Insulators
Philadelphia Electric
Company Supply Dept.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling—(See Conveying and Hoisting Machinery.)

Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Coils, Armature and Field
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Independent Lamp & Wire Co.
Rome Wire Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines
International Register Co., The
Johnson Fare Box Co.

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Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.
Wood Co., Chas. N.

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Handy Supply Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Electrical Mfg. Co.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
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Handy Supply Co.

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General Electric Co.
Westinghouse Trac. B. Co.

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Blaw-Knox Co.

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General Electric Co.
Westinghouse Elec. & Mfg. Co.

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General Electric Co.
Westinghouse Elec. & Mfg. Co.

Conveying and Hoisting Machinery
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Portable Machinery Co.

Conveyors, Coal and Ash
Portable Machinery Co.

Conveyors, Portable
Portable Machinery Co.

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International Register Co., The
Samson Cordage Works.

Cord Connectors and Couplers
Electric Service Supplies Co.
Samson Cordage Works.
Wood Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
Van Dorn Coupler Co.
Westinghouse Trac. B Co.

Cranes
Toledo Bridge & Crane Co., The

Creosoting. (See Wood Preservatives)

Cross Arms. (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossing Signals. (See Signals, Crossing)

Crossings, Track. (See Track, Special Work)

Culverts
Canton Culvert & Silo Co.

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Brill Co., The J. G.
Electric Service Supplies Co.
St. Louis Car Co.

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Imperial Brass Mfg. Co.
Oxweld Acetylene Co.

Dealers' Machinery
Archer & Baldwin
Cleveland Armature Wks.
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Foster Co., L. B.
Griswold Machine Co., Geo. M.
Hyman Michaels Co.
MacGovern & Co., Inc.
Zelnicker Supply Co., Inc., Walter A.

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Cleveland Frog & Crossing Co.

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Electric Service Supplies Co.

Detective Service
Wish Service, Inc., P. Edward.

Disconnecting Switches
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National Pneumatic Co., Inc.
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General Electric Co.
Hale & Kilburn Corp

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National Pneumatic Co., Inc.

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Woodmansee & Davidson Engineering Co.

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Cleveland Fare Box Co.
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Page Steel & Wire Co.

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Cleveland Fare Box Co.
Electric Service Supplies Co.
Star Brass Works.

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American Mason Safety Tread Co.

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Standard Steel Works Co
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General Electric Co

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Railway Track-work Co.

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Smith Heater Co., Peter.

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Smith Heater Co., Peter.

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Westinghouse Elec. & Mfg. Co.

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Ohio Brass Co.

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Niles-Bement-Pond Co.

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General Electric Co.
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Westinghouse Elec. & Mfg. Co.

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Eureka Co.
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Westinghouse Elec. & Mfg. Co.
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Schoonmaker, A. O

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Standard Paint Co.

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General Electric Co.
Wood Co., Chas. N.

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National Tube Co.
Nuttall Co., R. D.

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National Tube Co.

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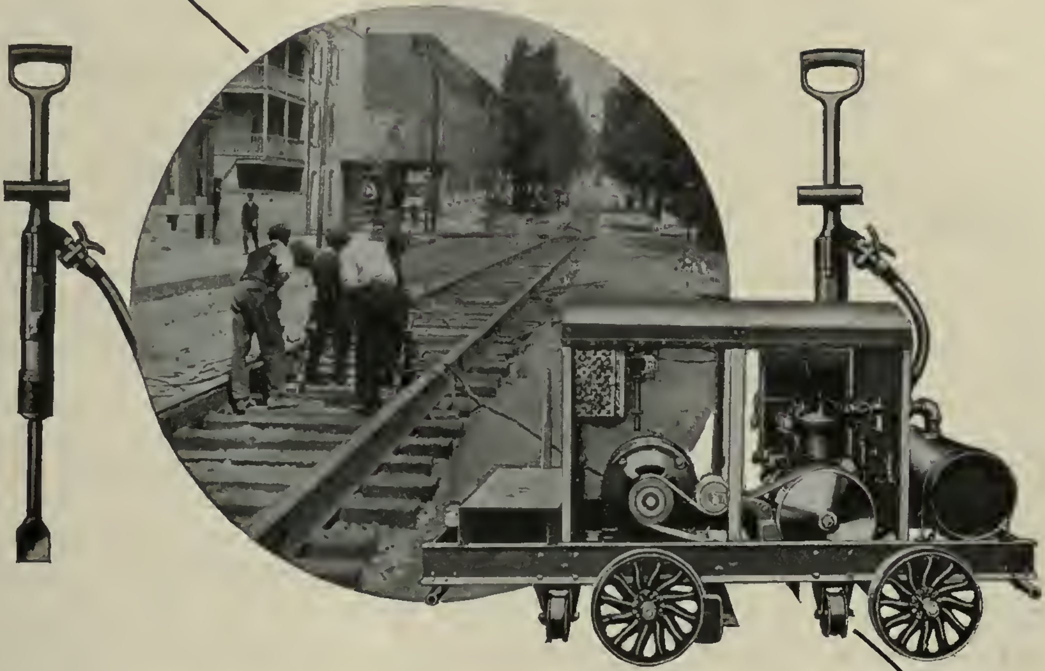

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Hale & Kilburn Corp

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U. S. Electric Signal Co.

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Ramapo Iron Works

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Weiss Switch Lock Co.

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Green Engineering Co

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Carnegie Steel Co.
International Steel Tie Co.

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General Electric Co.
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Nuttall Co., R. D.
Ohio Brass Co.

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Holland Trolley Supply Co.

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McGuire-Cummings Mfg. Co.
St. Louis Car Co.

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National Tube Co.

Turbines, Steam
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Westinghouse Elec. & Mfg. Co.

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Westinghouse Traction Brake Co.

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Holden & White, Inc.
National Railway Appliance Co.
Nichols-Lintern Co.
Railway Utility Co.
St. Louis Car Co.

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Williams & Co., J. H.

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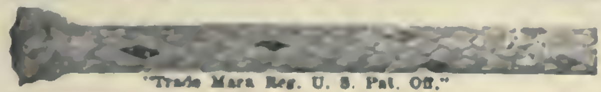

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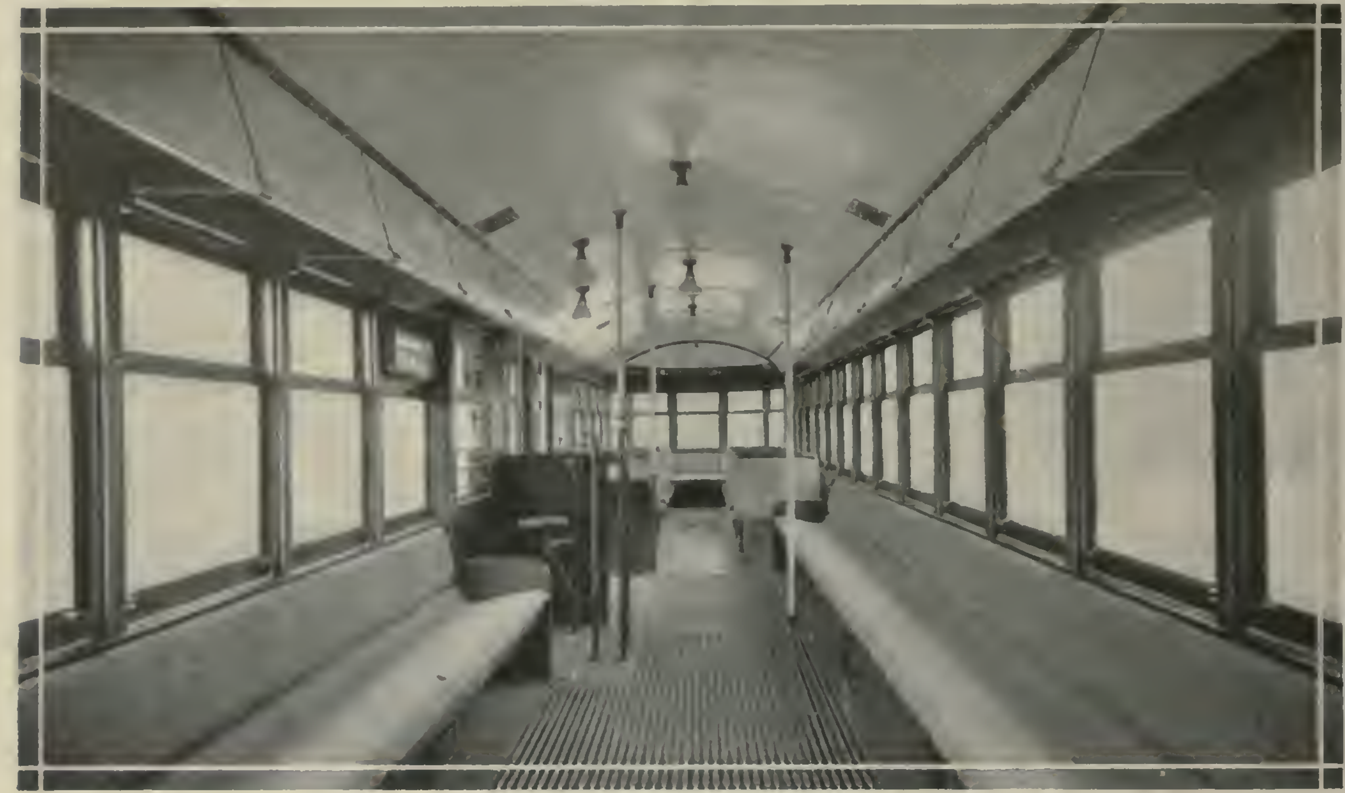

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The crowds won't lessen, the schedules won't improve themselves, and, unless the routing can be greatly improved or additional lines can be laid or quicker loading and unloading cars can be substituted, there is trouble ahead.

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What constant, insistent demands for more and better service!

What a lot is expected and what a lot must be given! What an amount of welfare depends on it!

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WASON MANUFACTURING CO.
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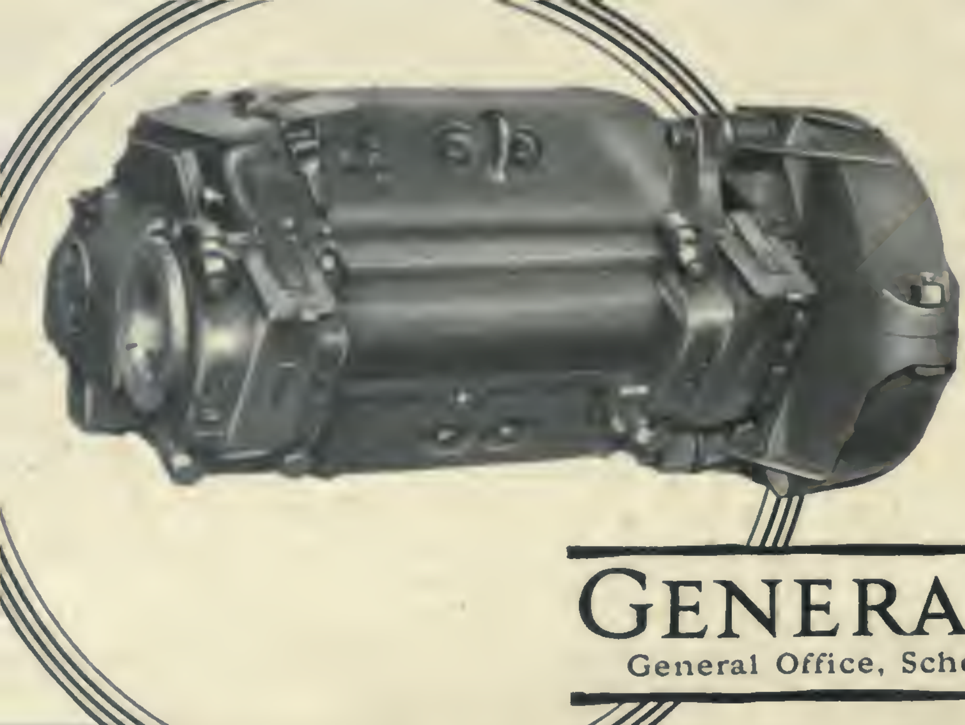
Hauling heavy trains in the West



The center entrance cars of the San Francisco Oakland Terminal Railways are operated in heavy trains by

G-E 240 Motors

and multiple unit control. During the hours of heaviest traffic it is often necessary to run trains of 6 to 8 cars to handle the crowds.

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25-31

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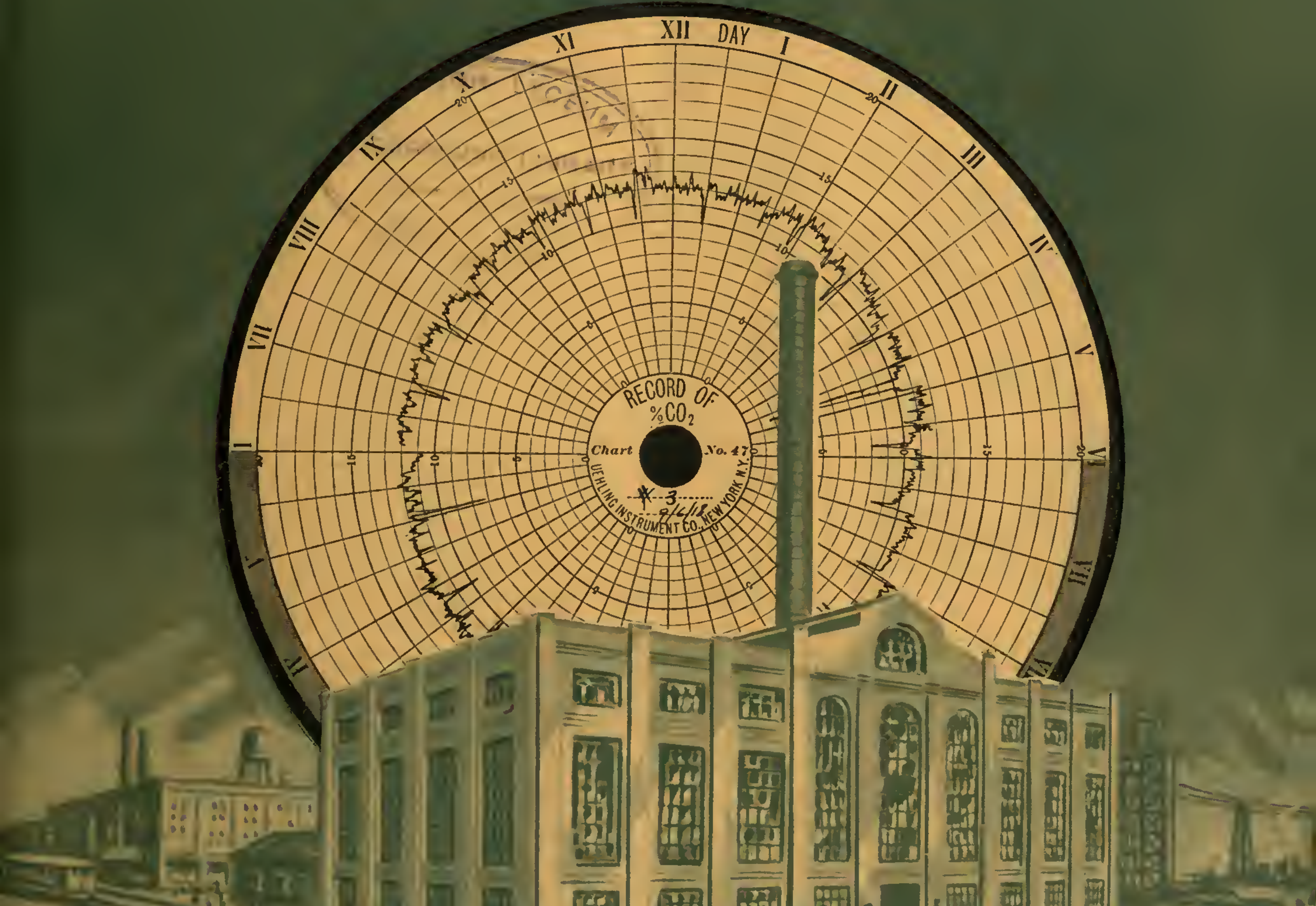
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Vol. 53, No. 8 New York, February 22, 1919 *Pages 351 to 392*

Electric Railway Journal

H. W. BLAKE, *Editor*

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For Voltages up to 750

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Shunt Resistance

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Open Track

Paved Track

Phono-Electric

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Bridgeport Brass Company
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2083

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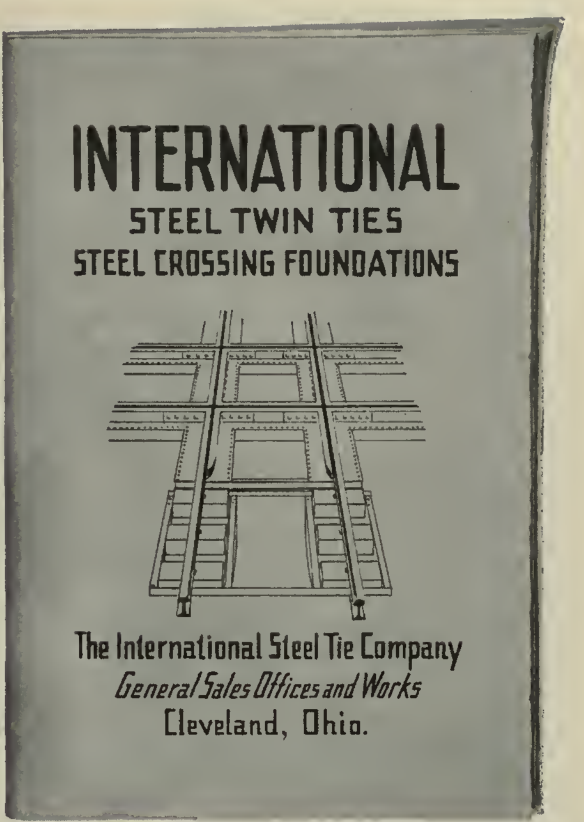

INTERNATIONAL
STEEL TWIN TIES
STEEL CROSSING FOUNDATIONS

The International Steel Tie Company
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Cleveland, Ohio.

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Page 12 of this Catalog

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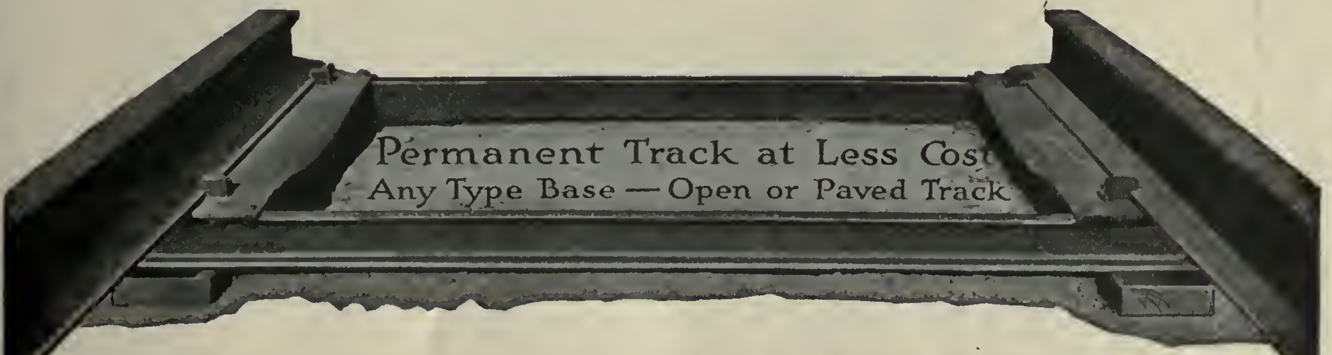
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Rome
Wire Company
Rome, N. Y.

All Operations from Wire Bar to Finished Product in our Plant

Rome-Wire

All of the Cars Running to the Great Hog Island Shipyard are Equipped with Keystone Motorman's Seats

Hog Island Car

Keystone Motorman's Seat

It's a good, long, hard run from Philadelphia to Hog Island, but Keystone Seats have made it easier and less strenuous for the motormen.

These motorman's seats are collapsible—with one kick the supporting rod collapses and the seat is entirely out of the way.

They are strong and adjustable.

They will make your men happier, more contented and better workers.

Write for data sheets.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Streets

PITTSBURGH
337 Oliver Building

NEW YORK
50 Church Street

CHICAGO
Monadnock Building

The MECHANICAL RAILWAY TIE

Before

After

By means of the

Dayton Rail Joint Booster

The upper left hand illustration shows the rails and supporting structure immediately surrounding the joint excavated. To the right you see the result a short time afterwards. The Rail Joint Booster has been clamped into place, welded, the bolts drawn up and the track jacked to its proven level—*a level from which the rails will never depart.* And traffic schedule has not been interrupted—no revenue has been lost, in these days when every penny of revenue is of such vital importance. The larger illustration shows a cross section of this Booster. Note its exceeding simplicity—yet you can easily get a clear idea of its great strength. TRY this Booster under the *very worst rail joint* in your tracks—just TRY it. Full particulars on request.

THE DAYTON MECHANICAL TIE CO.
201 Third Street Arcade
DAYTON, OHIO

An Important Notice

By the Chicago Pneumatic Tool Company to all purchasers and users of Boyer Pneumatic Hammers

Counterfeit spare parts of inferior quality are being fraudulently represented as suitable for Boyer hammers.

Such parts, made from improper material and of questionable accuracy, when used in our tools, will manifestly develop impaired efficiency.

As a measure to safeguard our customers in the use of our product, we have adopted

This mark of protection

which will hereafter be stamped indelibly on every Boyer hammer part as an assurance that it is genuine.

Users of Boyer hammers will protect themselves against spurious reproductions by purchasing directly from us, with the knowledge that only spare parts of our manufacture will maintain the high standard of performance and durability established for our pneumatic tools.

Unless genuine Boyer parts, bearing our trade-mark, are used in our tools, our service becomes ineffective and our guarantees are void

Chicago Pneumatic Tool Company

Fisher Building
New York Chicago San Francisco
Sales offices all over the World

Pioneers in Pneumatic Tool Progress

Millions

for

Maintenance

THE electric railways of America buy millions of dollars' worth of equipment, materials and supplies annually for maintenance. Even during the years in which financial burdens weigh most heavily upon the industry, maintenance work must go on. In fact, economies forced by financial restrictions emphasize the need of maintenance work. Apparatus must be kept fit for use, though it be repaired time and time again. Shops and repair gangs are kept busy these days on Maintenance work for power plants, substations, bridges and structures, track and roadway, overhead systems and rolling stock.

The most active time of year for maintenance work is fast approaching and the *Electric Railway Journal*

Annual Maintenance Number

will, as usual, be the trusted guide of the officials who are responsible for the choice of methods, materials, equipment and supplies. The date of issue this year will be

March 22

The text pages will outline maintenance methods for all departments. The advertising pages will form the necessary complement by telling the readers what the manufacturers are offering.

The most experienced and successful manufacturers in the field regularly use prominent display advertisements in this issue. Most of them have already reserved their pages and double-page spreads for this year. Several are planning to tell their story at length, using four pages or more.

Printing begins March 12

There is just time to serve you well if you will send your space reservation and tell us whether or not you wish a copy suggestion from the *Electric Railway Journal's* Advertising Service Department.

Early action permits careful attention to details, gives ample time to submit proofs and to make any changes desired by the advertiser.

Don't wait for the last-minute rush.

Send your space reservation today and let the copy come soon.

Rates from $100 a page to $60 a page, according to amount of space used, or your contract rate if you are a regular advertiser.

Electric Railway Journal

Member Audit Bureau of Circulations
Tenth Avenue at 36th Street, New York

The "Apex" Joint
for Guard and Girder Rails

The "Simplex" Joint
for High Tee Rails

Whether you use Tee or Girder Rails You can eliminate Joints and Current Loss

with

"INDIANAPOLIS"

"Apex" or "Simplex" Welded Joints

and do it at no greater investment in *time* and *money* and *equipment* than you would find necessary to make *temporary repairs.*

In considering these points, you have the evidence of their satisfactory use by more than 100 electric railways, for whom they are literally saving millions of dollars.

Every poor joint offsets the savings of 10 good joints. Every Indianapolis joint will be perfect, and show more than 100% strength and conductivity compared to new unbroken rail.

Specify Your Needs at This Time.
Spring Will Soon Be Here.

Indianapolis Switch & Frog Company, Springfield, Ohio

The Thermit Process of Track Welding

Makes Permanent Joints **Costs less in the End**

The Thermit Process is the only method of rail welding which solves the problem by eliminating the joint, making a perfect weld between the rail heads. This method is much superior, both mechanically and electrically, to any other kind of joint. It makes a permanent union, which will last as long or longer than the rails proper. It has an electrical conductivity equal to the rail itself. Failure of a joint to conduct ALL the electricity to the power house means loss of energy, electrolysis and interference with nearby low voltage circuits.

Our Catalog No. 12, free on request, describes the Thermit insert rail weld and shows why this process is not only the best solution of the rail joint problem, but is also the least expensive method in the end, making due allowance for all considerations entering into track welding.

May we send you this catalog, or better still,
may we discuss track welding with you?

METAL & THERMIT CORPORATION
Successors to Goldschmidt Detinning Co. and the Goldschmidt Thermit Co.
120 BROADWAY, NEW YORK

329-333 Folsom St., San Francisco
15 Emily St., Toronto, Ont.
7300 So. Chicago Ave., Chicago
1427-1429 Western Ave., Pittsburgh, Pa.
Factories located at Chrome, N. J.; Wyandotte, Mich.; East Chicago, Ind.; Jersey City, N. J.

Use Trains Equipped with National Pneumatic Door and Step Control

For Relief from Congestion

The surface car train of today is found in various combinations such as end-entrance motor and near-entrance trailer; end-entrance for both motor and trailer; end-entrance motor and center-entrance trailer; center-entrance for both motor and trailer; motor car with motorless trailer; motor car with two-motor trailer; trains with or without multiple-unit connections.

But no matter what combination you select, you will find that its speed and safety in getting over the line will be greatly improved by installing

National Pneumatic Door and Step Control for quick, positive and laborless operation of doors and steps.

National Pneumatic Interlocking Safety Door Control for absolute safety to alighting and entering passengers.

National Pneumatic Motormen's Light Signals to eliminate waste of time with bell-cord signals.

Montreal, Philadelphia, Detroit and Cleveland are a few of the train operators using one or more of these National Pneumatic traffic accelerators. We shall be glad to meet your requirements, too.

NATIONAL PNEUMATIC COMPANY
INC.

NPC

50 Church St. New York

515 Laflin St. Chicago

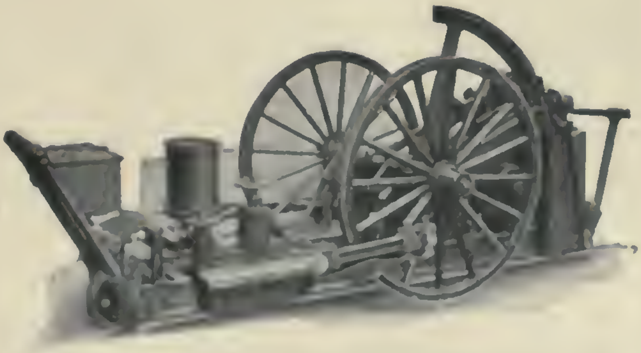
Very Small to Measure—
A Mighty Force for Harm

Beginnings of rail corrugation are like the storied leak in the dyke of Holland that the little boy stopped up by holding his finger in it until help and repairs came.

Like everything else rail corrugation has to have a beginning. Once started it generally grows very fast. Neglected it will finally ruin the track.

Reciprocating Track Grinders

are equally capable of grinding out corrugations whether they are shallow or deep. Indeed they have frequently saved great sums of money for traction companies by restoring to useful service stretches of track which had reached such bad condition due to corrugations or badly cuffed joints that they were apparently beyond any remedy short of complete replacement.



True economy in track grinding, however, consists of taking hold of the trouble in time, and before it becomes so serious as to cause damage to track foundations and make necessary the grinding away of a great amount of the rail surface.

There is no economy in waiting until the impact of rolling stock turns the infection of corrugation into chronic track disease.

Railway Track-work Co.

30th and Walnut Sts., Philadelphia

A Business Center in Chicago in 1848

If ever there was a city whose growth has been a monument to the value of good transportation Chicago is "it."

In 1905 *fourteen per cent.* of all the railway mileage *in the world* terminated and centered in Chicago.

As early as 1897 Chicago had within its own limits nearly one thousand miles of street railways. To be exact, 957.82 miles. More than twice as much at the time as any other city in the world.

Think of the effect of this on Chicago's growth.

Look at its results as expressed in the appreciation of real estate values alone.

Before the railroads came to Chicago a lot at 144 Lake Street was sold for $100. Twenty years later $64,000 was refused for the same property.

The commerce of Chicago grew by leaps and bounds and this stupendous growth has been exactly coincident with the no less stupendous growth and improvement in methods of transportation.

There is no effect without a cause. The moral holds in the case of

Galena Oils and Galena Service

Cause—better results at no more cost. Effect—roundly ninety per cent. of the railway lubrication business of America.

Galena-Signal Oil Co.
Franklin, Pa.

Dozens of Well Filled Store Rooms in Our Erie Plant Guarantee Prompt Shipment on Supply Parts For G-E Apparatus

Erie, Pa., centrally located, a port of entry and a terminal point for five important railways, is the site of a 300 acre plant of the General Electric Company. The principal product of this plant is railway and mining supply parts as well as the complete equipment. Vast stocks of finished parts are maintained for immediate shipment and excellent railway facilities insure prompt deliveries.

Maintain "original equipment quality" by means of G-E repair and supply parts—you can get them quickly.

General Electric Company

General Office Schenectady, N.Y.

40-39

Electric Railway Journal

Consolidation of STREET RAILWAY JOURNAL and ELECTRIC RAILWAY REVIEW

Volume 53 New York, Saturday, February 22, 1919 *Number* 8

Precedent and Warning in Seattle's Victory

REFUSING to be swayed or intimidated by the rampant element in labor unions, Mayor Hanson of Seattle succeeded in breaking the "sympathetic strike" that for a short time last week paralyzed the city. His act constitutes an excellent precedent for other mayors and at the same time a warning to labor agitators. The case is of national importance as a serious outbreak in America of the evil that has been undermining the organized labor of Europe. Mayor Hanson's proclamation on the second day of the strike urged the people of the city to go about their daily work as usual and guaranteed them "absolute and complete protection." He said, "We have 1500 police officers and 1500 regulars from Camp Lewis and can get the services of every soldier in the Pacific Northwest if necessary to protect life and property. We will see to it that you have food, transportation, water, light, gas and all necessities. The anarchists in this community shall not rule its affairs. All persons violating the laws will be dealt with summarily." Unless the decent, honest members of labor organizations refuse to be lead by I. W. W., radicals and anarchists, labor unions will sink to a low level in public esteem and will lose the right to respect and consideration. What has been done in Seattle could and should be done vigorously and promptly wherever labor organizations are so mismanaged that violent methods are resorted to, industry is paralyzed and propaganda is carried on urging labor to "take over the operation" of industries.

The Accountants Should Certainly Keep Moving

SHOULD the accountants continue their association work? This question, it is said, is in the minds of some members of the Central Electric Railway Accountants' Association, which after a period of inactivity enforced by war conditions reconvened for the first time in Fort Wayne last week. By all means continue, we say. We quite agree with the conclusion expressed by A. C. Van Driesen in his presidential address to the effect that the opportune time for the association to show its mettle is now and that it should get into the reconstruction period with vim and do all in its power to solve the various problems as they appear.

The work of standardizing accounts, it is true, has reached the point where only occasional revisions are necessary, but this is not the only topic in which an association of accountants should be interested. The accountant should no longer be interested solely in the mechanism of his work. He should be today the first assistant of the executive, capable of properly compiling, analyzing and comparing financial and statistical reports of the business. He should not simply furnish figures; he should use his mind to ascertain what the figures mean, not merely to help discover what might have been remedied but also to cause actual prevention if this is possible.

In short, one of the greatest values of accounting lies in the application of compiled data to future operation. Hence the accountant must acquaint himself with the general problems of the executive and then evolve the best methods of general accounting, fare accounting, cost accounting, statistics and the like to help the executive. For these reasons, the work of accountants' associations is not done.

It all depends on the point of view. If the accountant starts from his accounts and figures, his work may look complete. If he starts from the problems of the executive, however, he will undoubtedly find spots where more can be gotten from the accounts to help the executive. If the second course is followed, there will be no dearth of topics or work for any accountants' association.

Is There an Opportunity for Long-Haul Passenger Traffic by Auto Buses?

IN SOUTHERN CALIFORNIA auto buses still compete with the electric railways to a formidable extent on long hauls of both freight and passengers. Local regulations are imposed on the buses by the municipalities which are traversed, so that the problem of regulation is one in which state-wide action is required. Out of the legislation now under consideration it is hoped that relief to the electric railways will come, but as yet no plan has been proposed upon which the several interests involved can agree.

It has been suggested that the first step in the analysis of this problem is to answer the question as to whether the electric railway is essential to the progress and development of the communities involved. If this question is answered affirmatively, then the electric railway has the right to at least the same encouragement and protection as is accorded any other carrier. This means that the auto buses must be put upon a parity with the electric railways as to rates and dependability of service. For example, assurance of continuity of service should be required, responsibility for accident liability should be imposed, and the automobiles should be required to pay a fair rate for the use of the State highways. Moreover, and most important of all, a principle should be applied here that has long been established with respect to the paralleling of satisfactory service furnished by steam railroads. This is that permission to install competing service in such a case cannot properly be granted, and there is no reason for other than the same conclusion when one of the carriers uses the public highway and the other uses a private way.

With the excellent highway system and favorable weather conditions that exist in California it is natural that the problem should have become a serious one in that State. Weather conditions permitting, auto buses run between San Francisco and Los Angeles, a distance of about 500 miles, throughout the entire year. In the southern part of the State both freight and passenger buses directly parallel the electric railway for runs up to 60 miles in length. Under these conditions legislative action in California on the subject of regulation of auto bus transportation will be followed with interest the country over.

Proposed Power Plant Inter-connection in the East

SECRETARY FRANKLIN K. LANE of the Department of the Interior is proposing to spend $200,000 in an investigation of the possibilities of making savings by means of an inter-connection of electric power plants on the Atlantic seaboard. If this investigation is made it will yield data of great value as to the supply of electric power for the railroads and undoubtedly will show the advisability of extending electric operation which is effective now only in spots. It is proposed that trunk-line connections be made throughout what is called the North Atlantic industrial district, comprising the territory surrounding the industrial centers between Boston and Washington inclusive and extending inland to include Albany and Harrisburg. The proposal has an important bearing upon the electrification of steam railroads in this territory, as nearly all of the electrifications in the East are comprised within the district, and these all need to be extended to enable them to yield the full benefits for which they were installed. Of course such extension was impossible during the war period. The territory also includes a number of interurban roads which are of steam railroad construction and a very great mileage of urban and other interurban lines. There is a great reason, therefore, why the electric railway field should be interested in Secretary Lane's proposition.

What Secretary Lane hopes to accomplish by the proposed study was outlined in the news columns of this paper last week. As far as the economics of this matter of inter-connection of power systems is concerned, there is much to be said in favor of such inter-connection. Under such a plan power could be produced where water power or fuel abounds and it could be cheaply transported by electrical means. By connecting the many existing plants to a trunk line such as that suggested they could insure a more continuous output and they could draw upon the trunk line to supplement their own capacity at times of peak load or power shortage. There would, of course, be many administrative difficulties in connection with such a plan, which can be visualized as one tries to picture the actual procedure of furnishing power to the trunk line and drawing power from it. Moreover the operators of power plants are likely to feel that an expensive investigation cannot disclose much that is not known now. The theory of the situation is well understood, but how to apply it in a practical manner is another question.

What May Be Learned from Glasgow?

WE BELIEVE that American electric railway managers will find a great deal to interest and help them in the articles which we expect to publish during the next few months on British tramway practice. These articles are the result of a special study which is being made by Walter Jackson of our editorial staff who is now in Europe to investigate the question of the collection of zone fares and other features of British tramway practice. The article in this issue is the first of three which are to appear on the Glasgow system.

It is interesting, in comparing British and American tramway practice, to remember that many of the earliest British tramways were built by an American, George Francis Train, and that when the lines began to be electrically equipped, much of the apparatus came from America. In consequence, the development of the tramways in the two countries to a considerable extent has been alike along engineering lines, but the same cannot be said in regard to transportation methods. From the beginning the British companies have used the zone system, the controlling reason undoubtedly being the necessity of a fare based on the penny as a unit.

At the present time our American electric railway properties are facing a situation very similar to that confronting the British tramways when they began operations. Owing to changed financial conditions the nickel has become inadequate as a uniform fare in our city transportation while our next coin, the dime, seems too large. American railways must therefore decide whether it would be better to collect two coins for a uniform fare or adopt the zone system.

The difference in transportation conditions between British and American tramways has already been mentioned. Some of the points besides the method of charging for transportation are: The general use in Great Britain of double-deck cars, the absence of the prepayment system, the comparatively small extent of the railways compared with the population served, the lower wages paid and the density of tramway traffic. The extent of the latter difference is shown by the fact that the Glasgow Tramways for the year ended May 31, 1918, showed 16.7 revenue passengers per car mile and its average for the last twenty-four years has been 12.6 revenue passengers per car-mile. These figures compare, for various years ending between December, 1915, and December, 1917, with American roads as follows: Brooklyn surface lines, 5.5 passengers; Manhattan surface lines, 8 passengers; New York City surface lines as a whole, 5.7 passengers; Baltimore, 6 revenue passengers and 8 total passengers per car-mile; St. Louis, 5.8 revenue and 9 total passengers per car-mile.

These figures show that in Glasgow at least either fewer cars are run in proportion to the passenger-miles or that the tramway companies there have discovered the method of inducing riders to use cars for short distances. As the Glasgow articles will develop later, the latter explanation accounts at least in part for the denser traffic, and in these days of existing or potential jitney competition, this is a matter which can well engage the attention of the railway managers in this country.

The War Labor Board Activities and the Electric Railways

IN TWO cases recently a question has been raised as to the power of the War Labor Board. We refer to the late finding of the board in the Kansas City case and the recent hearing in the San Diego case—both reported in the ELECTRIC RAILWAY JOURNAL. In the former case the federal board apparently reversed its original position by ordering the company to pay a scale of wages which had previously been held beyond its financial ability to meet, the employees having agreed to wait for more prosperous days which an increased fare would have brought about. When the company's revenues showed no signs of improvement the men went on strike and later appealed again to the board for help. Being directed to carry out the original wage award the company management refused because its financial condition would not permit of making the extra payments.

In the San Diego case the circumstances are different. The company has not acknowledged the jurisdiction of the board or agreed to accept its decision, since the generally unjustified complaint of some of the men was filed after Dec. 5, when the board declared that joint submission would be necessary for it to take action in the case.

We are of the opinion that the Kansas City and the San Diego companies were entirely within their rights in taking this firm stand, and we also believe the time has come to question whether this federal agency—created for a war emergency—has ever been in a position to decide electric railway questions with entire justice to both sides. The conditions under which it carried on its work were such that it was in a position to act fairly with one of the parties before it, the men, but unfortunately it did not have the power to obtain justice for the other party in the case, the company. This was a fatal omission in the legislation under which the board was established. It could and did strongly urge upon the local authorities in many if not all cases where an increase in wages was ordered that a corresponding increase in rates be allowed, but these words too often fell on deaf ears. A series of receiverships and financial troubles was the inevitable consequence of so inequitable an arrangement.

We do not pass judgment on the fairness of the higher wage standards set up by the board. It is probably true that as a whole they were not more than were warranted by the increased cost of living. However, we fail to see the fairness of a situation where a corporation is asked to carry out an award which, without definite revenues, can mean only disaster. There should have been some way by which the board could have put these decrees into effect without crippling the employing company, as was done with the steam railroads where the rates were increased when higher wages were ordered. The lack of equity in the electric railway arrangement is so evident that we are sure the members of the board themselves must have felt its incongruity.

At present the War Labor Board is hearing no cases except such as are submitted by both parties to a dispute, so that its functions now are practically only those of a board of arbitration. Perhaps this is the best possible arrangement under the circumstances because neither side will feel compelled to join in a proceeding and will only submit to jurisdiction as a last resort and with the hope of getting a decision with which compliance is possible. Meanwhile it is to be hoped that the financial situation will improve for the utilities and they will not then hold back on meeting such wage standards as may develop in a competitive labor market. It is very likely that the labor situation will take care of itself after the War Labor Board goes out of existence.

Good Welders Are Needed to Produce Good Welding

THE idea of increased economy which may result from a broader use of welding in car construction has been emphasized greatly by war conditions. The costs of steel cars must be reduced, and a fruitful field for producing economy appears to be in decreasing the amount of riveting necessary. Welding has already been used to a limited extent in this work and has been found successful. The best method for increasing its usefulness appears to be in extending the process to more important members of the car body. Railway officials should not expect to obtain a rivetless car immediately, since it is necessary to proceed continuously and to gain experience by adapting welding to minor parts first.

Manufacturers have found that considerable skill is necessary to obtain satisfactory results in welding, and there is much to be learned in the handling of the apparatus and the welding materials. Experience indicates that in general the defects encountered are mechanical and are not inherent in the process. Skilled men working under competent foremen will do much to establish confidence in the reliability of welds. Such men will know that clean surfaces are necessary for good work and will be quick to recognize the parts that can be welded rapidly and cheaply. Men who know the underlying principles of welding and possess a knowledge of the materials to be worked will get the quickest results, effect the greatest saving and produce the best work.

Several very interesting papers dealing with welding problems and results were presented at a joint meeting of the American Institute of Electrical Engineers and American Institute of Mining Engineers in New York this week. While most of the information furnished was the result of investigations made with a view to applying electric welding to ship construction, still all branches of industry will be benefited by the advances made toward a better and more intimate understanding of some of the principles involved. Much study has been made of the structure found in electric welds and to devising non-destructive methods for testing them when completed. Such studies and testing methods are very valuable but, as was pointed out by one of the speakers, when welders of proved skill only are employed, under experienced supervision, then such tests will no more be necessary than are shear tests on every rivet that is driven. So long as such welders are not available, car builders will look askance at a process that may be good generally but may leave weak spots in the work, which spots may be very difficult or quite impossible to detect by inspection.

Mr. Dalrymple on the Value of the Zone Fare

WE HAVE never questioned the fact that the universal 5-cent fare has many advantages from the operating point of view. It is very simple in collection and easier for the conductor. But we have always contended that the universal fare is against the interests of the passenger.

In Glasgow we have never had single fare operation. From the inauguration of the tramways in 1870, we have always charged according to the distance traveled. The statutory rate is still a penny a mile. This was the rate when we started as a municipal system in 1894. Gradually we not only increased the distance given for a penny, but also inaugurated the ½d. for ½-mile fare. In 1911 we extended the ½d. distance to a mile or more, giving more for ½d. than the law demands for 1d.

Every change that we have made in reducing fares has meant to Glasgow both an increase in passengers and an increase in revenue. When we doubled the ½d. stage, our passengers per car-mile were already so high that we could not see how we were going to carry any more. The unexpected effect of the reduced rate was the filling up of the cars during the slack hours of the day. The amount of peak riding showed little change, as most of the peakload passengers rode in any case. Thus the traffic increased during the hours when the conductor had most time to handle it. With twenty passengers per car-mile, the cars are not crowded any more than when we were carrying fifteen passengers or less per car-mile.

In our older cities we were far more congested prior to the coming of tramways than we are to-day, so that the question of fares could have had nothing to do with the matter. When our tramways (in Glasgow) were organized in 1870, the penny fare carried the passenger out into the open. Even in the greater Glasgow of to-day, a 1½d. fare will take the passenger to green fields; and only 6.6 per cent of our passengers during the last year had to pay this fare. Of the remaining passengers, 1 per cent paid a 2½d. fare, 25.6 per cent a 1d. fare while 63.3 per cent paid only the ½d. minimum.

JAMES DALRYMPLE

We do not believe that the graded fare as applied in Glasgow is more complicated than the American system of cash fares and transfers and surely not as complicated as 6-cent or 7-cent fares and 1-cent or 2-cent transfers. Fare collection with us is a simple cash transaction. The passenger pays his fare, secures his receipt and we have done with him. We no longer sell tickets on the car at a discount, as we found that this resulted in abuses. The only tokens we have are fiber disks sold from the main office at full value. In general, our base fare is so low that we can dispense with the complexities of workmen's tickets, free transfers and the like. Even the minimum fare for children is ½d., and most of these sales are for the minimum ride granted to adults at the same rate.

Everybody in Glasgow knows the Tramways and takes an interest in them. There is no mystery about operation, fares or other features that interest the public; and when the masses do understand and appreciate the local street railway, it makes an enormous difference in results.

The Zone Fare in Practice—Glasgow

BY WALTER JACKSON

A BUSY EVENING ON THE JAMAICA STREET BRIDGE, GLASGOW

PART ONE

Congestion Not Due to Graded Fares

OF ALL the arguments raised against the principle of charging for street railway rides by distance, that of "congestion" holds first place. Parallels are drawn between American and European cities as to relative areas for like populations, and the draftsman invariably concludes that the congestion of the Old World city—which is taken for granted—and the diffusion of the New World city—which is also taken for granted—are due almost entirely to the differential fares of the one and the universal fare of the other. The most casual investigation *on the ground* will show that the connection between the distribution of population and the system of fare charging is a minor rather than a major factor in municipal development. It is not in Great Britain but in the United States that we find skyscrapers in the business district and elevator flats in the residential sections! Congestion there frequently is, of course, in both countries yet it would be erroneous to ascribe it to any one cause. However, so long as American electric railway operators will have to face the argument of congestion, which is bound to be raised by every land and house owner who fears the effect of a zone fare differential on his property, it is deemed well to set forth as many data as necessary to show whether or not such fears are justified. To this end, the following facts on housing have been gathered from direct observation, from official documents and from interviews with local municipal authorities.

NOTE:—*In view of the change from the convenient 5-cent fare to the inconvenient 6, 7 and 8-cent unit fares in the United States within the past year, and the indecisive results therefrom, the* ELECTRIC RAILWAY JOURNAL *decided that the time was opportune for a first-hand study of the zone or graded fare system used most commonly abroad. Mr. Jackson was therefore delegated to visit as many cities of the United Kingdom as appeared necessary to bring out the good and bad points of methods of fare charging and collection practices that are already being considered for the United States. This, the first article in the series, deals with Glasgow and its tramways, each of which is recognized as representative of the best British practice in municipal and tramway management respectively.*—EDITORS.

OBSTRUCTIONS IN AN OLD CITY ARE HARD TO REMOVE

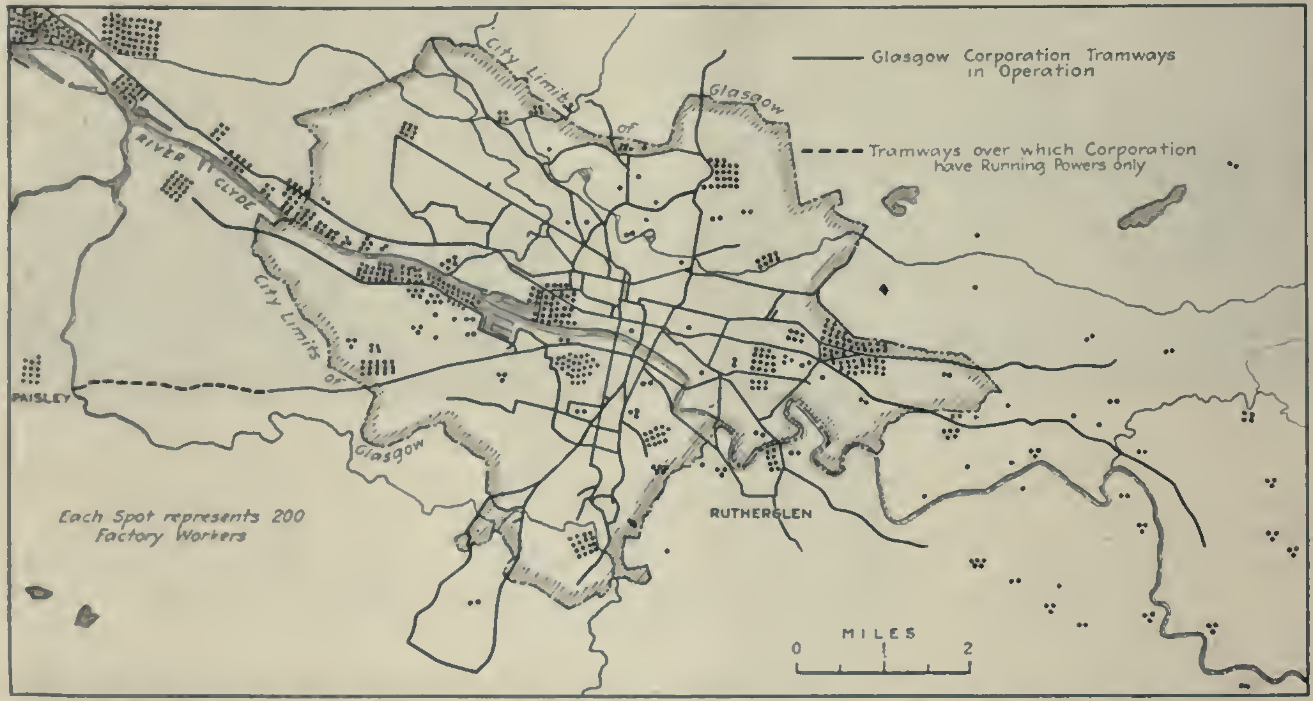
In American cities the work of one generation is largely effaced by the next. In European cities, old structures with or without historical associations are clung to with far greater tenacity. This is one of the prime reasons why the older, central portions of many foreign cities are so congested. Glasgow, whose roots go deep into Caledonian history, still shows many traces of the past although few British communities have been so enterprising. More than once, the official who dared to suggest the straightening of an old lane or the removal of a crumbling tower has been denounced as a desecrator! Naturally, the street railway service cannot be any better than the standard set by the principal downtown thoroughfares, and it is really a marvel that the tracks of Glasgow carry the enormous traffic that they do.

In the official history of "Municipal Glasgow—Its Evolution and Enterprises," the interesting fact is recorded that the discovery of America gave Glasgow its first impetus on a successful career. First it became a great port of embarkation and then an important center for sugar and tobacco. When trade relations were resumed in 1782, following the War of Independence, cotton was added to the important imports. From that period it may be said that the growth of Glasgow was no less phenomenal than that of American cities. The change from a cathedral and university town to a commercial center is indicated by these statistics of population:

1740	17,000	1901	761,709
1780	43,000	1911	784,496
1801	83,769	1912 (extended city)	1,008,487
1861	395,503	1917 (estimated)	1,104,240
1881	511,415		

Modern Glasgow, of course, is much more than a port. The River Clyde is the home of the greatest shipyards in the Old World, while the vast locomotive shops, general engineering plants and chemical works are responsible for the smoke-laden atmosphere which has led to the expression: "The engineering skies of Glasgow." Add to this industrial activity a climate with more than a fair share of rain, fog and cold, and we have the "makings" of a heavy riding town. Later figures will prove that the riding is there!

In order to show the relation between the industries and the housing facilities of Glasgow, the accompanying map is presented. On this map have been noted the location of every place of employment, except the smallest, together with the number of people at each place. It is evident from this that the great mass of workers will be found in the engineering plants on or near the Clyde. At the same time, it is observable that the city tends to grow radially, so that not all of the workers feel that it is necessary to live in the immediate vicinity of their place of employment.


Glasgow Corporation Tramways in Operation
Tramways over which Corporation have Running Powers only
City Limits of Glasgow
River Clyde
City Limits of Glasgow
PAISLEY
RUTHERGLEN
Each Spot represents 200 Factory Workers
MILES
0
1
2

MAP OF GLASGOW, SHOWING RELATION OF TRAMWAY LINES AND CITY GROWTH TO PLACES OF EMPLOYMENT

Although the area of the enlarged city is but 19,183 acres, it must not be supposed that it is a city of rookeries. On the contrary, a business structure more than six stories high is a rarity, while the prevailing type of flathouse does not exceed four stories in all. The accompanying engravings give a good idea of the prevailing types of buildings. The density of population is due more to the absence of large vacant spaces and of small houses in the older sections than to the presence of such tall structures as are found in many an American city of smaller population. Some of the larger manufacturers have also encouraged the construction of cottage towns near their plants, but this type of housing has not yet been developed to the same extent as in English cities.

CONGESTION PRECEDED STREET RAILWAY DAYS—MUNICIPAL HOUSING

As early as 1866, long before tramway transportation, the department known as the "City Improvement Trust" was constituted under the Glasgow improvements act. The preamble of this act stated:

> Whereas various portions of the City of Glasgow are so built, and the buildings thereon are so densely inhabited as to be highly injurious to the moral and physical welfare of the inhabitants, and many of the thoroughfares are narrow, circuitous and inconvenient, and it would be of public and local advantage if various houses and buildings were taken down and those portions of the said city reconstituted, and new streets were constructed in and through various parts of said city, and several of the existing streets altered, widened and diverted, and that, in connection with the reconstitution of those portions of the city, provision were made for dwellings for the laboring classes who may be displaced in consequence thereof.

The municipality began to acquire 90 acres of land in the congested areas, by compulsion or agreement, shortly after the passage of the act, but it was not until 1889 that it exercised the power of erecting new buildings upon the land thus acquired. However, between 1871 and 1884, the municipality had erected seven model boarding houses, six for males and one for females, with a total capacity of 2235 beds. In 1896, the municipality opened a different kind of boarding house, called a Family Home, for widowers who could not afford individual caretakers for their children. This institution has 160 bedrooms aside from the community rooms. The erection of model houses in place of those demolished was inaugurated during 1889 with two blocks of houses which consisted of stores on the ground floor and three stories for residential purposes. The stores, of course, permitted a greater total rental than would otherwise have been the case. In localities not so close to the business centers the entire structure is used for dwelling purposes.

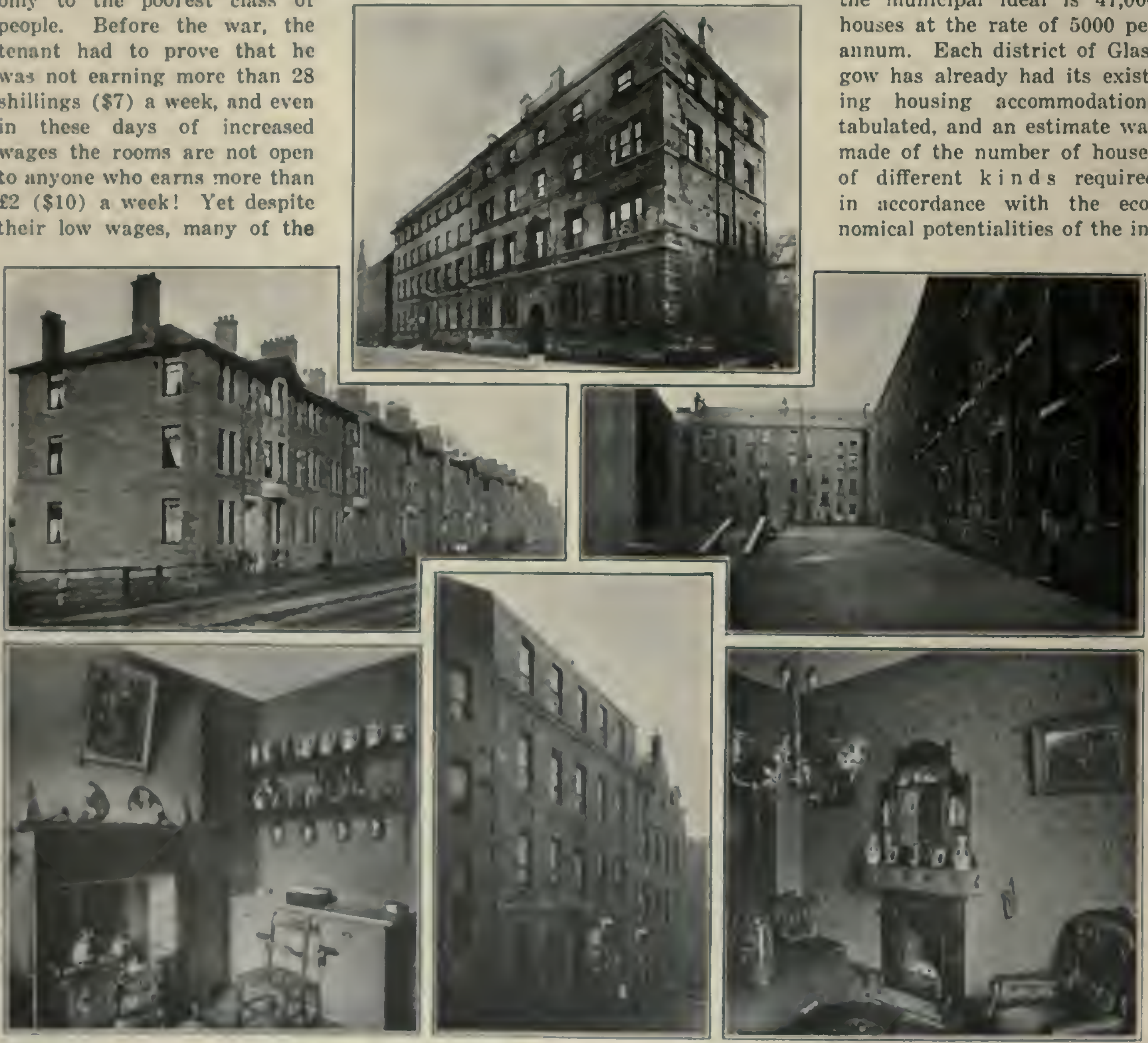
TYPICAL GLASGOW BACKGROUND, IN A RESIDENTIAL SECTION, SHOWING THREE-STORY HOUSES WITH STORES AT THE STREET LEVEL

By 1896, the reconstruction of all the vacant land or cleared areas was approaching completion. Thereupon new powers were applied for to deal similarly with slum conditions on the fringe of the original scheduled areas and elsewhere. This application resulted in the Glasgow Corporation act of 1897, by section 12 of which the municipality was authorized to purchase, by agreement, any lands not exceeding *in cumulo* 25 acres, either within the city or within one-half mile from the city boundary, for the purpose of erecting thereon dwellings for the poorest classes. The new buildings were up by the summer of 1906. At the time of the opening of the war in 1914, the municipality had erected 2199 houses comprising 592 one-apartment houses, 1334 two-apartment houses, 257 three-apartment houses and sixteen larger houses. All of these structures are still owned and administered by the city. For the American reader, it should be explained that the word "apartment" is used in the following sense: An apartment may be simply a single room much larger than the largest room of an American flat and capable of use as a kitchen, living room and bedroom; or it may consist of a room with a separate kitchen, two rooms and kitchen, three rooms and kitchen, etc. Bathroom accommodation may be found from the two-room apartments onward. The washrooms or laundries are usually in the courtyard and are used in common by a specified number of tenants.

In an interview given to the writer on Dec. 17, 1918, William C. Menzies, manager City Improvement Department, said that the war had temporarily halted the construction of more buildings by the city except

STREET TRAFFIC, UNION AND ARGYLE STREETS, GLASGOW. NOTE THE PREVAILING LOW BUILDINGS IN THE BUSINESS DISTRICT for some small tenements and forty-eight single-room apartments. These apartments are rented furnished at 7 shillings ($1.75) a week to people who have lost their furnishings through fire or other causes. The city entered this field of housing to correct the abuses to which these unfortunates were subjected by rapacious landlords.

Asked as to the willingness of the workers to live in suburban territory, Mr. Menzies pointed out that the city's houses at Cumbernauld Road, Kennyhill, were 3 miles from the center of Glasgow. These were let only to the poorest class of people. Before the war, the tenant had to prove that he was not earning more than 28 shillings ($7) a week, and even in these days of increased wages the rooms are not open to anyone who earns more than £2 ($10) a week! Yet despite their low wages, many of the tenants worked on the other side of Glasgow 8 to 10 miles distant. To use the expression of a Kennyhill lodger who was interviewed later, they don't mind spending extra "cuppers" for the privilege of living in a section which is still in the open country. A visit to Kennyhill disclosed neat stone houses with tiled halls, toilets on each floor for every three tenants and wash houses in the yards. The rooms were fewer in number but larger in size than would be found in a poorer-type American flat, and the structures as a whole were more substantial than frame houses common in America. The views on this page give a good idea of the types of buildings erected.



APARTMENT HOUSES AND TENEMENTS WITH MODERATE RENT ERECTED BY THE CORPORATION OF GLASGOW

The Glasgow municipality now has in prospect a housing scheme which involves the provision of 7000 dwellings at Govan, Bellahouston, Mosspark near Corkerhill, Gilsochill, Coplawhill, Cathcart Road, Maryhill, Kennyhill and other suburbs. It is intended to erect cottages and tenements of three to six apartments, each house with baths and sculleries, and attached to cottage garden plots. Nor is this all, for the municipal ideal is 47,000 houses at the rate of 5000 per annum. Each district of Glasgow has already had its existing housing accommodations tabulated, and an estimate was made of the number of houses of different kinds required in accordance with the economical potentialities of the inhabitants. Glasgow knows it has slums and is anxious to get rid of them. In fact, to judge from the December election posters, the main differences between the candidates was as to how far they were willing to go in voting for housing measures and low rents, and the present tendency is toward renting future buildings at pre-war figures with the deficit to be divided between the state and the municipality. The objection raised to the latter scheme is that it will be exploited by employers to pay lower wages.

It may be noted that in the newer plans provision is made for garden plots wherever possible. This tendency has been encouraged by the city's experience in renting plots for "war gardens" to working people. These were rented at the rate of 4 shillings 3 pence ($1.06) per annum for allotments of 200 sq.yd. According to A. R. Crawford, of the City Assessor's department, in an interview granted on Dec. 18, 1918, the way the workers took to these allotments indicated that they would be glad to live in localities where house and garden would adjoin. An extra penny for fare, he said, did not and would not deter the worker from moving to more modern houses in better surroundings.

BUILDING RULES HAVE MADE TALL HOUSES IMPOSSIBLE SINCE 1900

Hitherto, reference has been made only to the municipality's direct purchase of property for rebuilding. However, since the Glasgow buildings regulations act of 1900 and its amendments of 1908, private owners are subject to far more restrictions than is common in American cities. According to paragraph 60, Part VI, no building except a church shall, exclusive of turrets or other ornaments, may exceed in height one and one-half times the distance between the building lines of the street on which it is located; and in no case may the height exceed 100 ft. without the consent of the municipality. If used as a dwelling the restriction on height is still greater, according to paragraph 61, which reads:

> No tenement and no building to be used as a dwelling house shall hereafter be erected the front walls of which measured from the level of the ground at the center of the face of any such wall shall exceed in height the distance between the building lines of the street. . . .

The height of a tenement is measured as from the level of the street to the ridge of the roof. It may be of interest to point out here that the roofs are usually sloped, but that in a local pamphlet by Margaret H. Irwin, entitled "Industrial Housing from the Housewife's Point of View," the suggestion is made that Glasgow dwellings be provided with fenced flat roofs in order to secure ample and safe playing ground for children.

New streets in Glasgow must be at least 50 ft. wide.

The foregoing restrictions as to height of buildings are typical of the regulations that are contributing to the wellbeing of Glasgow's citizens of all classes. The housing abuses of the past are still numerous, but the point to be emphasized here is that the modernization and expansion of Glasgow is in nowise hindered by the condition that transportation in that city is paid for by the mile.

The second article will discuss the origin and growth of the Glasgow tramways, their standards of speed and service, their rates of fare and their extraordinary development of traffic.

The third and concluding article of the series will consider the standard double-deck car used on the Glasgow system, the make-up of schedules, the hours and rates of pay of transportation employees and the checking and auditing of the graded fares collected. A special effort will be made to point out the points in which the practice differs from that on an electric railway in the United States.

Co-operation Makes Safety Work Successful

The "North Shore" High-Speed Interurban Line Reduces Accidents Forty Per Cent Through Co-operation of Employees

BY CHARLES B. SCOTT

Safety Engineer Chicago, North Shore & Milwaukee Railroad

THE operation of such a system as the Chicago, North Shore & Milwaukee Railroad involves serious safety problems, which can be met only by a thoroughly organized effort in the line of accident prevention. Some of these problems become apparent when it is stated that this road furnishes high-speed interurban service between Chicago, Ill., and Milwaukee, Wis., a distance of 73 miles, 3 miles of which is through the very congested district of Milwaukee. The intervening territory is thickly populated and includes the towns of Evanston, Wilmette, Winnetka, Lake Forrest, Glencoe, Highland Park, Highwood, Fort Sheridan, Great Lakes Naval Training Station, North Chicago, Waukegan and Zion City, in Illinois, and Kenosha and Racine in Wisconsin. This company also operates the city lines in Waukegan and one of the city lines in Milwaukee. In addition to the cars required for the local lines the equipment consists of seventy interurban cars, ten express cars, four large electric locomotives, one hundred and fifty freight cars, and the appropriate number of line and work cars, steam shovels, plows, sweepers, etc. Practically all highway crossings are at grade, many of which are protected by gates, flagmen or wigwag signals, as described in the issue of the ELECTRIC RAILWAY JOURNAL for Feb. 17, 1917, page 303. There are 625 employees, not including the office force.

The present management fully appreciated the necessity for organized safety work, and established a safety department in August, 1916. This is conducted along the same business lines as are employed in the company's operating department.

The plan of safety organization employed by the company comprises the following: (1) A central safety committee, composed of heads of departments, with the superintendent of transportation as chairman. This committee has full charge of all matters pertaining to accident prevention and holds its stated meetings bi-monthly. (2) Eleven employees' safety leagues so distributed with respect to departments and hours of service that they include in their membership all employees and thus definitely identify each with the safety organization and its work. Each league has its own set of officers including chairman, vice-chairman and secretary, and such committees as may be necessary. The officers are elected by ballot and hold office for one year. Meetings are held bi-monthly.

From the beginning of the movement the employees have been urged to submit safety recommendations, and since its organization the central committee has received and acted upon 935 such suggestions, most of which originated at employees' safety meetings. Fully 85 per cent of these have been approved and most of them were followed, while others are being taken care of as rapidly as possible. The fact that so many of the recommendations of the employees were approved speaks well for the intelligence of those who made them, and the further fact that the company carried out the recommendations, in many instances at heavy expense, accounts in a large measure for the continued and helpful co-operation of the employees in the safety work.

One of the unusual and important factors in the effective plans adopted has been the effort of the company to enlist the interest and help of the school children in the territory served. Mrs. Elizabeth Tobey and Mrs. Minnie Riddle, representing the company, have delivered safety lectures in all of the grades and to all of the school children in the territory served by the company. In every instance the courteous and earnest co-operation of the school authorities and teachers has been received, and the interest of the children has been created and maintained. To aid the teachers in continuing the work, a booklet, "methods for Instruction in Accident Prevention for use in Schools," was furnished to each, and in many cases, school safety bulletins were supplied for posting in school rooms. This school work has been reflected not only in a clear record of safety to school children but has also been of value in creating a better feeling toward the company.

There has been a steady reduction in the number and seriousness of accidents from the beginning of the safety work, but the best results were obtained in the year 1918. The records show the following reductions for that year as compared with 1917 in spite of an increase of about 60 per cent in gross earnings, with the resultant increase in the number of passengers carried and Increase in car miles operated:

Items	Per cent Reduction 1918 Over 1917
Employee accidents	17.4
Employees disability accidents	38.3
Lost time on account of employee accidents	34.3
Public accidents	45.4
Property damage (public)	44.8
Total damage all kinds	34.1

In the beginning of the movement the recommendations of the employees concerned largely the physical conditions of the equipment, but during the last year more attention has been paid to careless operation, failure to observe certain safety rules and orders, etc.

The central committee has always considered the safety department as important as the mechanical, operating or any of the other departments, and has given whatever time was necessary thoroughly to investigate every suggestion which came to it from any source. It was thus able to act intelligently upon each, realizing that it was only by intelligent and persistent work that satisfactory results can be obtained. The employees also have shown commendable willingness to co-operate with the central committee and are justly entitled to a large share of the credit for the result.

In addressing the members of the Windsor (Conn.) Business Men's Association recently on the state of the electric railway industry in general and of the Connecticut Company in particular, J. K. Punderford, general manager of the company, made the following significane statement: "To my mind the great danger at present is the fact that the public does not seem to believe that some solution of the electric railway's problem must be immediately arrived at or the discontinuance of street railway operation threatens."

Women Replace Motormen Successfully at Vancouver, Wash.

WHEN the difficulty of getting platform men merged into impossibility, R. M. Boykin, manager of the traction system in Vancouver, Wash., notified the Public Service Commission that he was going to put women operators on the cars. Ways and means of finding the right kind of women and properly training them were found and the plan has the unqualified endorsement of the management.

Mr. Boykin recently said to a representative of this journal: "Perhaps the plan would not have been so easy to work out under conditions before the war but we have been able to employ women who are able to operate cars on our system just as well as the men and they are, as a rule, more careful. The matter of suiting the training to women is comparatively simple, the biggest problem is in the selection of the right women from among those who apply."

Newspaper advertisements were used to secure applicants. After the first few trials the ads. were worded to explain clearly just what the work was and the replies then came along about as fast as they could be handled with the regular organization. Of those who successfully pass the first interview, only about one in six eventually qualify as motormen. The Vancouver system includes only about 20 miles of track, and because of the comparatively light traffic single operators only are put on the cars on some of the runs. Thus all carmen, women included, have to be trained as both motormen and conductors and at times serve in both capacities. The women are receiving 25 cents per hour during the instruction period. Thereafter they get the same wages as the men, ranging from 40 to 45 cents per hour. Thus far the women's hours have not been extended beyond 8.30 p.m.

The only serious accident thus far involving a car with woman operator, was a head-on collision on a curve, caused by a freight crew cutting into the passenger car's time. The woman operating the passenger car, as later examination showed, had turned the controller to off position and applied all the brakes before stepping back into the car just before the crash.

Glasgow Inaugurates Parcel Carriage

On Jan. 6, 1919, the Glasgow Corporation Tramways began the carriage of parcels between Glasgow and the suburb of Uddingston, distant about 8 miles. For about one month in advance announcement of the proposed service was made by car posters. The plan to give this service grew out of the work of the Road Transport (Board of Trade) Committee which was appointed some time ago to seek means of saving gasoline and horse provender. For this service, which does not include wagon or door delivery, these charges apply:

For Each Separate Parcel or Thing	
Not exceeding 7 lb. weight	3 d. or 6 cents
Between 7 lb. and 14 lb.	5 d. or 10 cents
Between 14 lb. and 28 lb.	7 d. or 14 cents
Over 28 lb. and less than 56 lb.	9 d. or 18 cents

The parcels car is a former passenger car from which the seats have been removed and the original sliding doors in the bulkheads replaced by two-leaf swing doors which can be locked.

What Is Wrong with the Railways?

A Canvass by This Journal Among Public Service Commissioners, Mayors, Chambers of Commerce and Civicists Brings Out Striking Reasons for Difficulty Experienced by Electric Lines in Increasing Fares

WHAT is wrong with the present electric railway situation, and how can it be improved? With the desire to secure answers that would aid electric railways in the study of reconstruction problems, the ELECTRIC RAILWAY JOURNAL recently sent out a questionnaire to more than 400 public service commissioners, mayors, representatives of chambers of commerce and other leaders interested in civic affairs.

The replies have not been so numerous as to indicate that representative public men in general are willing to commit themselves in regard to their beliefs concerning the relations which now exist and those which should be brought into existence between electric railways and the communities served. Nevertheless, about 15 per cent of the total mailing list responded, the percentage of replies ranging from 16 per cent for chambers of commerce to 11 per cent for civicists. From these it has been possible to prepare a fragmentary but interesting analysis of public thought.

The questionnaire began with the following valid and generally accepted premise:

> All statistics tend to prove that commodity prices have now reached a much higher level than during pre-war days. The operating expenses of electric railways have necessarily increased on account of the rise in the cost of all materials and labor that enter into the production of service.

The questions thereafter dealt with three main points—the reasons why electric railways have experienced difficulty in securing fare increases, the course which they should follow in seeking fare adjustments, and the policies which should govern in regard to guarantee of return, municipal ownership and other fundamental matters. Only the replies on the first point will be covered in the present article.

Why has it been difficult for electric railways to procure increases in fares to cover increases in expenses?

The above-stated leading question brought a somewhat varied lot of replies. The greatest variety of assigned reasons was in the case of the public service commissioners. The replies from this class represented sixteen states, divided roughly along geographical lines as follows: New England and Middle States, three; Central States, six; Southern States, three, and Western States, four. Of the total sixteen, seven are states in which the amount of electric railway mileage is relatively small and the companies few in number. The commission group included one chief engineer and one accounting supervisor.

To take the replies received, however, solely upon the basis of the ideas presented, the following points may well be noted. Probably the most striking opinions by commissioners were one to the effect that the regulatory system itself lacks sufficient power over rates and two to the effect that some rate-making bodies have shown a lack of courage in their work. Three commissioners mentioned overcapitalization as one of the causes of public antagonism, while four felt that the public had not been convinced of the insufficiency of the existing rates, and three declared that the public believes the companies to have made more than a reasonable return in the past.

In addition, individual commissioners mentioned the bad effect of the established custom of charging 5 cents for any ride, the imperfect methods of making change for higher fares, mutual misunderstandings on the part of the railways and the public, and a lack of appreciation by the public of the common interests of transportation agencies and the communities served. One commissioner also pointed out that electric railways have sometimes suffered undeservingly from being made a football in local politics. On the other hand, another regulator thought the railways had aroused antagonism by repudiating fare contracts which they had claimed to be inviolable when the cities had desired lower fares.

The civicists—among whom were four bureaus of municipal research—likewise attributed the fare-raising difficulties of electric railways to several causes. Besides mentioning two or three noted above, they directed attention to the points of opposition on the part of electric lines to the idea of closer public control, the subconscious feeling of the commissions that they are protectors of the public rather than judicial bodies, past sins of the railways and poor service.

The most emphatic insistence upon poor service and improper past actions as controlling factors in the present situation, however, was made by the mayors and the representatives of the chambers of commerce. These two classes seemed largely of the opinion that the public now distrusts electric railway officials because of past performances. Five out of the thirty replies for these two groups mentioned overcapitalization. Two of the business men stated that the reversal of the companies in regard to the sanctity of franchises had aroused public opposition, and two others thought that the need for higher fares had not been proved.

Below are reproduced in detail some of the most striking replies by the various classes:

COMMISSIONERS

To speak generally, the difficulties encountered by electric railways in increasing fares have been due to the timidity and in some cases the cowardice of rate regulatory bodies in combination with other causes.

No other industry seems to have the same amount of difficulty in raising the price of its commodity or service in keeping with the general advance in prices as the electric railway. This, in my opinion, is partially if not principally due to the long-established custom of using the single 5-cent coin as the unit of fare, which unit of fare carries the passengers varying distances.

In many instances, traction companies have been made the footballs of politics and public prejudice has been worked up against them. Then again, in some instances, there is watered stock and overcapitalization, requiring dividends on more than the actual investment. Moreover, in some instances, public service commissioners, although knowing the facts, have lacked the courage of their convictions and have failed to deal justly as between man and man, without fear or favor.

The railways have been injured by the making of contracts on the basis of 5-cent fares and their hard insistence through years that such contracts were sacred. Now these upholders of the sacredness and inviolability of contracts repudiate their previous stand. The public believes that it has had to stand and deliver in days of prosperity and that the companies should stand to their contracts now—at least to the 5-cent limitation.

In the opinion of the general public and municipal authorities, existing rates were compensatory.

Almost the whole reason is that over-capitalization and manipulation have led the public to lose confidence in these corporations.

Securities have been watered, and surpluses above a reasonable return have been accumulated in the past.

There is a long-established principle that rates should be averaged over a period of years.

The public has a fixed idea that electric railways have earned large amounts of money to which they were not entitled.

Mutual misunderstandings have arisen.

The chief reason is that the laws and their interpretation, as well as the entire machinery of regulation, do not square with the facts of the situation. The commissions should have full power to deal with rates, and they s have facilities by which they can keep constant track of the needs of the companies, so as to increase or decrease as conditions justify.

The railways could not convince the people of their exact condition. They did not attempt to create public sentiment in their favor and educate the people to it.

The public has been educated to low fares and, having no accurate knowledge of the subject, assumes that increases are not necessary.

Inconvenience in making change for higher fares has been the cause.

Partly if not largely the reason is that the public feels it has not had all the facts presented. The better informed ones know that the big item of investment has not been materially altered by war conditions, while the uninformed think that the usual margin between operating revenues and operating expenses is so great as to stand a considerable increase.

There is a lack of appreciation of municipal necessity and mutual interests which must exist between railways and the public.

MAYORS

Wretched service and inconsiderate treatment of the public have been the chief obstacle in this city.

Poor service and the "public be hanged" attitude in previous years when the railways were making money have aroused opposition.

The public has no confidence in traction officials. The belief is general that enormous profits have been made in the past and concealed in some "mysterious" way.

Existing franchises are not being lived up to in any respect, and the railways are overcapitalized.

The reason is that the standardized fare of 5 cents has been maintained in the past, regardless of length of ride or quality of service rendered.

There is an instinctive feeling on the part of the public that the remedy will not cure the disease—bring sufficient revenue. It is like increasing tolls on a toll road—the policy tends to bring disuse.

The reason is largely that the railways do not fairly show the necessity for higher fares.

Poorer service is given and a higher fare asked.

Antagonism has largely been aroused in the past by the disregard of popular appeals.

The public believes that the old rate is sufficient to give a fair return upon the actual investment.

In the past utilities have capitalized on their earning capacity, and now when the high price of both labor and material reduces this earning capacity, their bonds and their stocks do not represent tangible value.

REPRESENTATIVES OF CHAMBERS OF COMMERCE

The public believes that utilities, because usually monopolies, are always evil monopolies, and that a large part of securities represents only wind and water.

Railway service is very close to the citizen, and it is subject to many interruptions and in our city to severe snow storms. The average passenger cares only for good service, and when it fails he complains but forgets to give credit for good service. Therefore almost all customers are enemies.

The electric railway manager of the next few years will need to know more about public psychology than he does about rails and fittings. Most managers in the past have not concerned themselves with public opinion except at those rare times when some concession was wanted. As a result, the managers of today have inherited from their predecessors no easy task.

Electric railways have encouraged the "big ride for a nickel" idea to help get themselves established. Now, when 5 cents is not a sufficient price, the roads have not carefully explained why it is not.

There is antagonism between railways and public. Some of the old sentiment implied in the famous phrase "the public be damned" still remains.

A prejudice in the public mind has been caused by the early extravagance of the railroads.

Public ill-will has been created in congested centers by years of continual refusal of electric railway officials to coöperate with the public.

Our local company is under a 5-cent contract until 1923. It refused a few years ago to obey a city ordinance requiring six tickets to be sold for a quarter, although it was generally conceded at the time that the company could well have afforded to do so. The people feel that the company should now live up to this contract. The situation is also complicated by the fact that a neighboring company has a 5-cent contract until about 1933, and the people there decline to stand for any increase in fare.

There is general public distrust and ill-feeling toward the management.

In keeping with its distrust of all corporations and "big business," the public is not convinced that the condition of the electric railways is as serious as it has been represented by them.

The public could not or would not see that the integrity of its service depended on compensating rates.

The reasons for public antagonism to higher fares are past sins in inflation of stock, bad management, and the too prominent "the public be damned" policy.

Franchise conditions are the cause.

There is a widespread public belief that electric railways are necessarily wealthy and could easily reduce dividends without looking to the public.

There is a vague idea on the part of the public that utility companies are badly overcapitalized and have been "gold mines."

CIVICISTS

The reasons for opposition to higher fares are the general objection of the public to any increase, coupled with a lack of understanding of the situation, and in some cases the sub-conscious feeling of commissions that they are the protectors of the general public rather than judicial bodies.

Past sins of omission and commission are largely the cause.

The local public is not very keen on increasing the rates when it believes that it is not getting adequate service under the present system and did not even under pre-war conditions.

The public does not accept as true the statements of the railways, for past performances have destroyed confidence. When the public wanted lower rates in the past, the companies often pleaded that the law protected them. Now they want justice.

The public feels no partnership in or responsibility for the operation of electric railways. Such control as the public has acquired has been over the protest of the companies, leading to added hostility. The companies have failed to catch the spirit of the times by neglecting to invite into their management representatives of their employees and disinterested public citizens who could help to overcome the unfavorable reputation of the early practices of these companies.

The cause is the imperfect understanding (a) of electric railway economics (b) of the business, social and æsthetic value to the community of electric railway service and (c) of the future capital requirements of the industry to enable it to satisfy the rapidly increasing transportation needs of the public.

Has the difficulty of procuring increased fares been due to a fixed idea on the part of the public that electric railways have in the recent past profiteered, that is, earned large amounts of money to which they were not entitled?

Besides asking the general question of why electric railways encountered obstacles in obtaining higher fares, the questionnaire in this connection directed attention to certain subsidiary questions, in order to secure specific answers on points which it was desired none should overlook. The first of these questions, relative to profiteering in the past, is stated above.

That the public fixedly believes electric railways to have earned large amounts of money to which they were not entitled was the opinion of forty in the various classes. Several thought that the opposition of the public to higher fares was only partly caused by such a belief, but only four deemed the opposition not to arise from this cause. The leading detailed replies follow:

Commissioners

The idea has prevailed that electric railways have unduly profited in the past, an inheritance from the era of liberal and possible overconstruction.

The public has been led to believe that electric railways have earned money to which they were not entitled. This idea has been "pounded into the public" by designing politicians who knew no more about the actual facts than the public but capitalized this idea for the purpose of securing votes.

In our city this is true largely because it is believed that the electric railway system is overcapitalized.

Very largely this is the case. There has been a great deal of so-called "high-financing" in the promotion of electric railways, a fact the public has not forgotten.

In many cases this is true. The companies themselves have promoted the idea in their desire for additional franchises.

I should not consider this a fundamental reason. But there undoubtedly is some resentment of regulatory bodies over past obstructionary methods by the companies when the issues involved a reduction in rates.

A great many people assume this to be true, having no definite information to the contrary.

The public believes electric railways have been run for the benefit of promoters and speculators, whose prospectuses and security selling advertisements claimed big profits. Now the speculators can suffer. There is a great deal of sentiment that public utilities could afford to live on "accumulated fat" of previous years.

Mayors

Undoubtedly the public feels that the companies have been making large profits. When the 5-cent fare produced a large margin, the electric railway operators educated the public that this was a standard amount they should pay for a ride. As a consequence, they are now reaping the whirlwind.

At first this was the case; it is only partly so now.

Undoubtedly such a sentiment has prevailed to a considerable degree.

Representatives of Chambers of Commerce

I do not think the average rider knows much about the profits of electric roads.

It has been shown that the common stock of the consolidated company in this city was largely issued as bonus and promoter stock. Knowledge of this fact and that 6 per cent dividends has been paid on this stock for a number of years past undoubtedly has influenced public opinion.

Public feels that the roads have overcapitalized in times of prosperity and are now asking the public to pay the bill.

In part, yes; and in part because of the belief that the electric railways are selfishly trying to capitalize the present situation for the purpose of improving their financial condition.

Yes, owing to the consolidation of small companies with increase of capital stock.

There is a strong sentiment of this sort in the public mind which has found expression in newspaper columns and in the action of municipal authorities and legislators.

Civicists

The companies have not necessarily profiteered, but the public believes that poor service has been accorded it especially when a fair return was being earned.

In part only. It is more a lack of confidence and a feeling that the railways should bear losses as others must.

Yes, in part. The management of the electric railways has not generally been of a character to acquire public confidence. Franchises, capitalism, stock watering and high-finance mergers, as well as political corruption in the past, have not been sufficiently offset by a public-spirited policy in the present. What the public remembers regarding the companies is largely unfavorable to them.

Has the difficulty of procuring increased fares been due to a selfish interest on the part of the public evidenced by an unwillingness to pay more for service so long as they can procure this service without paying a higher price?

The general tenor of the replies to this question was negative. Five replies noted the inherent characteristic of the human race to want to procure a service or commodity for a price no higher than necessary, but only eight deemed this a controlling factor in the electric railway fare situation. Six of these were public service commissioners. Twenty-two answered "No," and most of the remainder of the fifty-eight replies were to the effect that only part of the public has been actuated by such a motive. Some of the replies follow:

Commissioners

This is not altogether the case, although if the question is changed to a statement it would express a fact inherent in the human race applicable to all services and commodities.

The great public always endeavors to secure the most service possible for the smallest amount of money.

This is so on the part of many people, although they would admit that the cost of production and operation in every other line of business has increased tremendously.

Yes. But the public does recognize the change in operating costs and is willing to waive franchise provisions of 4-cent ticket fares, special rates for school children, etc. Its resentment—and economies—are not registered until there is proposed a raise higher than the 5-cent fare of the franchise.

Such a sentiment would be held by only a small minority.

This is not necessarily the case, although it is a factor. Our experience has been, however, that the public has been favorably disposed to increases during the war period.

I do not think so. My opinion is that the public is willing to pay properly for what it gets providing the facts are clear and the methods of dealing with the facts are just.

A large part of the public is influenced by this motive.

I doubt if this idea holds with the majority. Most people are apparently willing to pay a fair living price when the price is clearly shown to be fair.

People are willing to pay when they are convinced that it is necessary in order to maintain the physical and financial integrity of the service.

Mayors

No. The public is willing to pay what the service costs.

Although human nature is such that no one desires to pay an increased price for any service or commodities, I believe there is a greater reluctance on the part of the public to pay the increase for the service of the public utilities than for other things.

Undoubtedly this is true, but the selfish attitude is generally created and fostered by the newspapers.

The public appears to believe that the service is not worth more than 5 cents. This is evidenced by the fact that a large part refuses to ride at a higher rate.

This is only human, and, of course, has to be reasoned with.

Representatives of Chambers of Commerce

The public is as willing to pay for electric railway service as for any other. When the jitney gives better service, there is no sentiment for the franchise holder.

No. There is rather a feeling that increased fares would mean increased extravagance.

The public is naturally disposed to be fair to electric railways and is willing to concede much so long as it is fairly treated; but it resents any attempt to enforce economies of operation like the skip-stop, pay-enter system, elimination of jitneys, crowded cars, etc., when at the same time car riders are asked to pay higher fares. Naturally the people do not wish to pay more for anything than they have agreed or are compelled to pay.

There is no doubt but that a part of the public would hold the railways to the old rates, regardless of whether these were fair or unfair, but this is not true of the rank and file or of the majority. The majority of the people of every community are willing to pay for the cost of the service when once convinced as to the actual cost.

In part this is true, but the feeling is due more to a lack of understanding than to selfishness on the part of the public.

CIVICISTS

In part, yes. Owing to the hostile attitude of the public and its belief that the companies were not genuinely concerned for public service, and owing to the lack of direct voice in the management of properties, the public has felt no responsibilities for the present financial embarrassment. There has been too much banker control of the companies as opposed to stockholder control, and stockholders have been too limited to provide an adequate popular basis for good will.

This is not an actuating motive with any considerable portion of the public. People desire to be shown, and rightly, the justification for higher fares, but once convinced they are glad to pay their just dues.

Has the difficulty of procuring increased fares been due to a belief on the part of the public that electric railways have accorded the public unfair treatment in the past through overcrowding of cars, poor service, etc.?

Eleven commissioners, ten mayors, twelve business men and three civicists all expressed the view that the opposition to higher fares arises from a public belief in the past existence of inadequate service in some form. Twelve more in the various classes judged that part of the opposition comes from this cause, one voting "Very slightly." Only four out of the total of fifty-eight answered with an outright "No," three of these being commissioners. The more important answers are as follows:

COMMISSIONERS

Inadequate and unsatisfactory service constantly imposed is the big factor. The "public-be-damned" attitude on the part of officers and employees is a big contributing factor.

Yes, decidedly yes. In the cities where the companies have had a social side and have tried to meet the demands of the public for service, our commission has not found opposition of a strenuous character to proposals to relieve the companies of their franchise obligations as to fares. But where the policy has been "the public be damned," the public now reciprocates with that spirit most enthusiastically.

That depends on local conditions. While such arguments are invariably used by those opposing rate increases, I believe they are frequently employed because of the lack of something better.

This is certainly a strong idea. It is often expressed to me: "Let the utilities give us good service, and we will be willing to pay more if necessary to give a living profit." But people fear additional fares will go into the company's pocket with no improvement in service.

MAYORS

This is the chief but not the only factor.

Yes. The past policy of "the straphanger pays the dividends" and of giving improved service only when absolutely compelled to do so has lost to this utility the good will which should exist among customers of any enterprise.

The "public-be-damned" spirit of the railways in the past is now bearing fruit, in spite of the efforts of the railway companies in the past ten years to change public opinion by a "public-be-pleased" attitude.

This may be true to some extent, but it is not the principal reason.

This has prevailed in some cities and is often believed when it is not true.

REPRESENTATIVES OF CHAMBERS OF COMMERCE

Yes—but it is nearly all due to "belief."

It is not only a belief but also a constant fact, and it is the extra crowd that makes the money.

This is the main reason, not only "in the past" but also in the present. Under a 60 per cent increase in fare we are getting crowded cars and poor service.

Yes. An early recognition of the rights of the public would have averted much of the ill feeling and prejudice which now exists against electric railways.

Undoubtedly this has much to do with the situation, as the public has come in close contact with employees of the road who are oftentimes discourteous and assume an attitude of ownership rather than of public service.

In some communities this belief is quite general, due mostly to the attitude of the management in years gone by. Furthermore, there is no doubt that every community has some people who feel that they have been unfairly treated.

Yes. Because the public does not understand the difficulties in the practical operation of electric railways, it is using the present opportunity to vent long-standing "complaints."

CIVICISTS

To some extent this is true, but more opposition is due to dissatisfaction with present rush-hour service, for the public has no conception of the difficulties connected with the rush-hour operation.

In large cities the public has generally experienced inconvenience from reliance upon electric railways as the sole means of transportation. The monopolistic character of these services has created an actual sense of resentment because of the public's dependence upon them exclusively. This attitude could be overcome, I believe, through the public having a greater voice in the management.

Very largely this is so. The economics of electric railway operation are not understood. Physical limitations of track capacity and the burden of extreme loads need to be impressed on the public at large.

Has the difficulty of procuring increased fares been due to a desire on the part of the public or their official representatives to secure a readjustment of the franchise or contract relations between the communities and the electric railways?

The answers to this query were not so one-sided, although the negative ones predominated. The commissioners who expressed a positive opinion on this point voted "Yes" in five instances, "No" in five instances and "Partly" in six instances. Most of the thirteen mayors and seventeen business men answered "No," but four in each group expressed the interest of public officials or reform organizations in franchise reconstruction at a time deemed more or less propitious. Three civicists answered "No" and one "Yes." Some of the replies are given below:

COMMISSIONERS

I do not believe that the public greatly concerns itself in this respect. Newspapers and public officials often tie into such matters for reasons obvious to the better informed public.

No, except that there may be the desire for readjustments in policy which would result in the companies living up to their franchise and contract obligations.

This depends on local conditions, although I think there may be a more or less general sentiment for franchise readjustments.

I have no doubt that in certain communities nothing substantial will be done in the raising of rates until a comprehensive franchise settlement is made with the city. I do not see how it can be otherwise.

Unquestionably, franchise problems have complicated the situation, and blame lies on both sides in recent as well as past history. As long as electric railway service is subject to "bargaining trades," this impediment to flexible and fair adjustments will remain.

MAYORS

Public officials would like to secure a readjustment of the franchise relations, but that is a matter in which the public would take little interest if the service were good and the public satisfied that the fare covered only a reasonable return on the real value of the traction properties.

In some cases the public has sought to take advantage of the emergency of the utilities in order to be relieved of the antiquated or unfair franchise provisions adopted many years ago.

No. These readjustments of franchise obligations are inevitable, however. Unfair or incomplete franchises must be remodelled.

Yes, on the part of a minority composed mostly of small business men and reform organizations studying the problems of transportation.

Public officials naturally desire to correct some of the mistakes made in franchise ordinances and believe that the company should make concessions when they are asking some from the city.

REPRESENTATIVES OF CHAMBERS OF COMMERCE

It is generally felt that an unfair franchise could now be adjusted upon a basis of fairness to the public.

No, except in some few isolated cases where the issue of municipal ownership was active.

There is very little of this feeling in our community. Only a few of the more thoughtful men are looking toward modification of perpetual unlimited franchises.

CIVICISTS

In general, the existing franchise provisions are not consonant with present public conceptions of an equitable arrangement between the corporations and their communities. This is an incident—a reaction from the distrust that prevails. Seldom is there a fundamental difference of opinion on franchise which is dissociated from the adequate service—reasonable fare issue.

The second article will cover replies regarding what fundamental facts should be presented to convince the public that higher fares are necessary.

Portable Hydraulic Jack Made from Old Car Axle

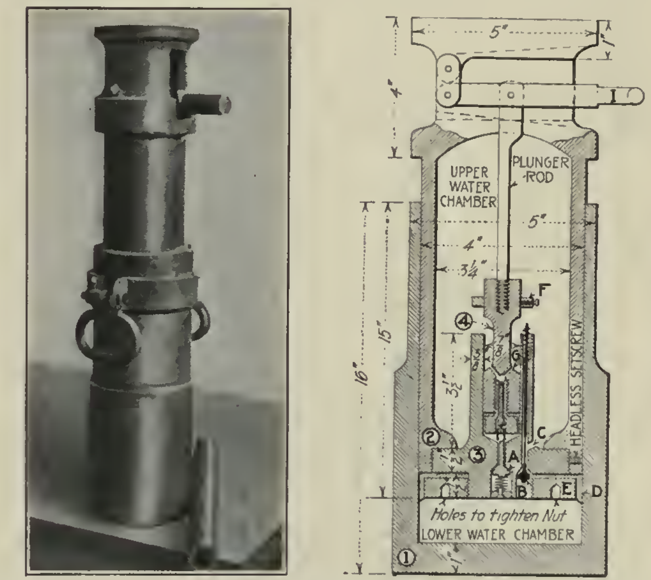
Chicago Elevated Railways Makes an Efficient 75-Ton Hydraulic Jack from Scrap Material for Shop Use

IN THE Wilson Avenue shops of the Northwestern Division of the Chicago Elevated Railways a portable hydraulic jack which is giving most satisfactory service was designed and built almost entirely from scrap materials, the greater part having been taken from an old car axle.

Some years ago a rather cumbersome hydraulic jack was in use around the shop and although there were several features about it which were not satisfactory, the principle was realized to be superior for many purposes to other types of jack. The machine shop foreman, therefore, during spare moments, set about making up a jack which would be capable of exerting the necessary force and would at the same time be easily moved about by one man and fulfill other requirements.

The completed jack and design of the various parts are shown in the accompanying illustration and assembly drawing. The lower water chamber (part 1 in the drawing) is turned down on a lathe, from a 16-in. length of axle to the exterior shape shown. This is then bored out 4 in. in diameter leaving a minimum wall thickness of ½ in. and a bottom thickness of 1 in.

The upper water chamber and its parts are considerably more complicated in design. This chamber also is made from a piece of car axle. The portion, which is 4 in. in external diameter (part 2) to fit into the bottom chamber, is 14½ in. long and is bored out, with the exception of a shoulder left ½ in. from the end, to an interior diameter of 3¼ in. leaving a wall thickness of ⅜ in. The ½-in. length from the end to the shoulder is threaded inside. The valve chamber (part 3) which screws into this is also made from a piece of axle 4½ in. long turned down in the initial stage to 3¼ in. in diameter. For ½ in. on one end this is turned down to 1⅝ in. in diameter and threaded. The next ½ in. remains at 3¼ in. in diameter and also is threaded. The remaining portion is formed into a cylinder 1⅝ in. in exterior diameter, ⅞ in. in interior diameter and 3½ in. deep. A valve, *A*, is placed in the end as indicated in the drawing. Vertically through the wall of this chamber a hole is bored the entire length and fitted with a valve rod, *B*, and spring as indicated, a port being made at *C*. This is the release valve. A leather cup gasket, *D*, is placed on the end of the valve chamber and held by the nut *E*. The plunger (part 4) fits the interior of the valve chamber and is formed and attached to the plunger rod as indicated. Two points in connection with this should be noted, first that the collar *F* is set to open the release valve; second, that there are four port holes, *G*, to admit water to the plunger valve *H*.



HYDRAULIC JACK MADE IN CHICAGO ELEVATED RAILWAYS SHOPS. ASSEMBLY DRAWING OF HYDRAULIC JACK

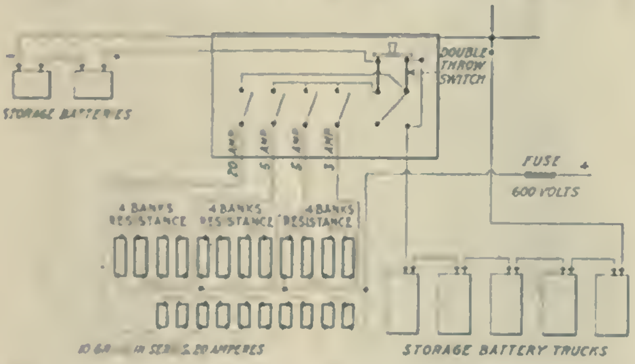
The working of the jack is simple. As the handle *I* is raised water is admitted to the valve chamber, and passes through the ports *G* and valve *H*. Lowering the handle forces the water through the valve *A* into the lower water chamber and raises the load. It will be noted that the handle which fits onto *I* has a lip which keeps the collar *F* on the plunger from coming in contact with the extension rod of the release valve *B*. To lower the jack the handle is removed and the plunger rod dropped. This opens the release valve and permits water to pass up through the valve *B*, out through the port *C* and back into the upper water chamber.

This jack has an effective lift of about 8 in. and weighs about 75 lb. which permits it to be easily lifted around by one man by means of the handle arrangement. The jack is used mainly in removing and putting on truck bolsters which requires a lift of from 60 to 75 tons. The jack was recently used in pressing a spider on an armature and it was estimated that a force of 165 tons was exerted.

Battery Charging at the Cleveland Railway Shops

Trucks, Tractor and Portable Batteries Charged in Armature-Winding Room, Heat from Resistors Being Utilized in Baking Oven

IN ORDER to provide convenient facilities for charging portable storage batteries, storage-battery trucks and tractors, this company has recently set off part of the armature-winding room for the purpose and has installed there a concrete charging bench, switchboard, cable terminals, etc., as shown in the accompanying photographs. At present four Buda trucks are in use for transporting materials for the mechanical and building departments, distributing these to various sections of the shops. The tractor is used for moving trailers and dead motor cars from one department to another. Provision has been made for charging both portable batteries and trucks at the same time, and the capacity of the equipment is ample simultaneously to charge all that are likely to require charging. This charging work is done at night. The wiring diagram reproduced herewith shows the relation of the several pieces of apparatus.



WIRING DIAGRAM FOR BATTERY AND TRUCK-CHARGING EQUIPMENT

The concrete bench, which was constructed against the wall at a height convenient for manipulation, contains two charging stations in series for the portable batteries. The surfaces of the bench and of the floor of the charging station are sloped so as to drain into the sewer, providing a convenient means for flushing them. At the boundary of the floor is a curb against which the vehicles rest when charging, and from this curb the cable terminals project.

GENERAL VIEW OF BATTERY-CHARGING TABLE, SWITCHBOARD AND CABLE TERMINALS (PORTABLE BATTERIES IN PROCESS OF CHARGING)

A switch cabinet is mounted on the wall, and provides control of both truck and battery terminals. It contains switches for use in regulating the resistance in circuit and also a double-throw switch which when in the "up" position provides for charging both trucks and storage batteries and in the "down" position cuts out the battery circuit. The truck-charging rack contains five charging stations connected in series as indicated in the diagram.

The charging is regulated by resistors composed of three sets having a capacity of 5 amp. each and one set of car grids with a capacity of 20 amp. The connections in the switch cabinet provide for from 5 to 15 amp. on the batteries and 5 to 35 amp. on the trucks.

The resistance units are fastened to the under side of the floor beneath the bake ovens, the charging equipment being, as stated above, in the winding room. The heat thus derived is used to assist in heating the ovens, the hot air flowing through a large duct in the floor. This prevents waste of energy and offsets any objection that might be made to the use of resistance control as compared with drawing the power supply from a motor-generator set. It only remains to state that the trucks and tractor are in the care of the mechanical and building departments although they may be used by other departments.

The Harvard Avenue shops of the Cleveland Railway, in which the above-mentioned equipment was installed, were fully described in the issues of this paper for Jan. 23, 1915, page 168, and Nov. 20, 1915, page 1022. Since those articles were published a number of short ones like this have appeared, giving details of special features.

TRUCKS AND TRACTOR IN CHARGING POSITION, CONCRETE CURB AND CABLE TERMINALS IN FOREGROUND

ANOTHER VIEW OF TRUCKS AND TRACTOR AT THE CHARGING STATION

Boston Trustees to Spend $21,500,000

Public Administrators Plan Capital Expenditures for Next Five Years—Cost of Service Increased $4,600,000 in First Six Months of Public Control—Trustees Believe Zone System Should Be Tried

HEAVY increases in the cost of service in the last half of 1918, ineffective efforts to secure adequate revenues through a 7-cent and later an 8-cent fare, improvements in service and equipment, and plans for the building up of the system—such constitute the main topics discussed in the report of the public trustees of the Boston (Mass.) Elevated Railway for their first six months of control. This report is abstracted in the following paragraphs.

The two leading issues which confronted the trustees when they took possession of the property on July 1, 1918, was the existence of an operating deficit and the demand of employees for a wage increase totaling more than $5,000,000 a year. The latter was referred to the War Labor Board.

To increase the operating revenue a 7-cent fare was put in force on Aug. 1. In four months this fare resulted in an increase in revenue of only $1,005,918, or a little less than a 16 per cent gain over the same period in 1917 when a 5-cent fare was in force. On Dec. 1 an 8-cent fare was put in force with a resultant gain of $595,499 for the month or a 36 per cent increase over December, 1917. Owing to a decrease, however, in the revenue in July under a 5-cent fare, the total increase for the last six months of 1918 was about $1,500,000. During the same time the cost of service increased more than $4,600,000, so that the aggregate deficit for the last six months of 1918 was approximately $3,070,000, as shown in Table I.

What Boston Needs in the Next Five Years

To afford service reasonably free from interruptions caused by the breaking of cars, old or out of repair, and to effect economies which can be reflected in lower fares, the following capital expenditures for the years 1919-1923, inclusive, are proposed by the public trustees of the Boston Elevated Railway:

Cars	$10,500,000
Power	5,000,000
Track work	2,000,000
Shops	2,500,000
Miscellaneous	1,500,000
Total	$21,500,000

COSTS INCREASED $4,600,000 IN SIX MONTHS

The distribution of the increased cost of $4,600,000 for the last half of 1918 can be seen from the following figures:

Increase in Operating Expenses:		
Maintaining track, line equipment and buildings	$485,000	
Maintaining cars, shop equipment, etc.	359,000	
Power	603,000	
Wages of conductors and other transportation employees	1,223,000	
General expenses	127,000	
Depreciation	832,000	$3,629,000
Increase in Fixed Charges:		
Taxes	$12,000	
Rent of leased roads	27,000	
Rents for subways and tunnels	244,000	
Interest	63,000	
Rental in form of dividends on preferred and common stock under act of 1918	658,000	1,004,000
Total increase		$4,633,00

Of the $3,629,000 increase in operating expenses, more than one-half or $1,859,000 represents the increase in wages caused largely by the awards of the War Labor Board and the tendency of certain crafts to withdraw from the carmen's union and require that the company enter into separate agreements for the payment of craft wages. While this has meant an increased wage in every case, the trustees state that it has not been entirely without benefit, as the company has been permitted to get away from the seniority rule prevailing in the carmen's union and can hire men more skilled in the respective crafts.

The increased cost of material has had an important bearing in all departments of the company's work; while it has not been figured in dollars, it may be said that in many instances the cost of material has advanced 100 per cent. The increase in the cost of power resulted from the increase in wages and the increase in the consumption and the cost of coal. Owing to inferior grade of coal received, 9500 tons more coal, at an average cost of $7.47½ per ton, were used.

The increase in general expenses was caused by the increase in the cost of printing in connection with the introduction of 7 and 8-cent tickets and to the raise in wages of clerks under the War Labor Board award. Depreciation increased because a very inadequate amount had been charged to depreciation in the past. The trustees have determined upon $167,000 a month, or $2,000,000 a year, as the proper amount to be charged for depreciation.

The increase in rentals of subways and tunnels was largely owing to the opening of the Dorchester tunnel in the last six months of 1918. The increase under the head of dividends represents the rental paid by the State for the property owned by the company, being the amount required under the acts of 1918.

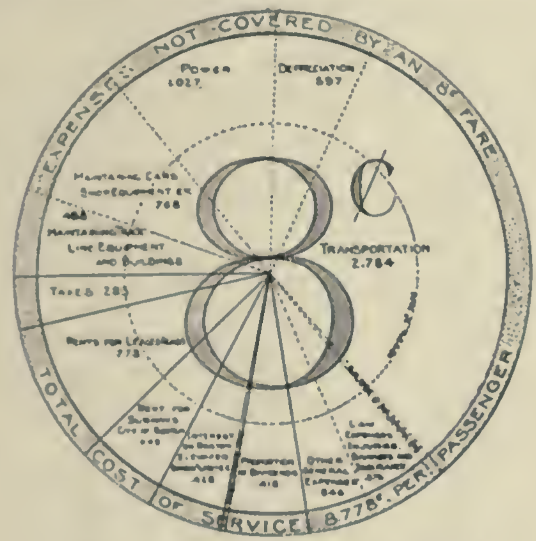
The cost of service as defined in the law for the six months of public operation amounted to 14,526,432. Based on the figures of the month of December now available, when the cost of service per passenger was 8.778 cents, the distribution of cost for each 8-cent fare collected is as shown in the diagram on the next page. The amounts making up the cost of service for this month are shown in Table II.

ZONE SYSTEM TO BE TRIED

The 8-cent fare, it is said, is to be continued in force long enough to provide an experience of at least four months. Paper tickets, however, have proved unsatisfactory, and metal tokens were ordered on Dec. 9, 1918. These tokens will be placed in use on Feb. 22.

1919. With their introduction all fares will be collected at prepayment areas and on prepayment cars through the deposit for each fare of a token in a self-registering fare box in the manner that nickels were formerly collected. In this way fraud in collection is reduced to a minimum.

In regard to a zone system the trustees say that such a system would seem to be more equitable than a flat fare as passengers pay according to the service rendered. The trustees are not convinced that the arguments against a zone system—to wit, that it tends to congestion in the inner zone, that people have settled in suburbs in reliance on a flat fare for the entire territory served by the Boston Elevated system, that a zone system costs more and that collection of fares under it may inconvenience passengers—outweigh the arguments in favor of introducing a zone system. They believe that at least there should be a trial of a zone system in Boston. Through such a trial the wisdom of those advocating it can be proved or disproved.



COST OF SERVICE PER PASSENGER FOR MONTH OF DECEMBER, 1918

Therefore, the trustees purpose some time in April to install a zone system, dividing the territory served into an inner and outer zone, in each of which the fare will be 5 cents. The zone boundaries will divide the population served about equally, so that it is reasonable to expect the result will be equivalent to that of a 7½-cent fare upon the basis of the number of passengers who ride to-day. The 8-cent fare is said to be causing many to walk who would ride at 5 cents, and it is therefore hoped that increased riding under two 5-cent zones will yield the company more revenue than the present 8-cent fare.

LABOR SUPPLY IS INCREASING

The labor situation has been much disturbed during most of the time since the trustees took office, and the shortage of men has prevented or delayed many contemplated improvements. The absence of men and a more than usual amount of sickness accounted for it. More than 1600 men left the company's employment to enter the army or navy.

A shortage of 353 blue uniform men on July 1 and of 569 such men on Nov. 1, however, has been entirely eliminated. The turn-over of platform men has been very rapid, as is shown by the fact that since the trustees took office 2295 blue uniform men have been employed and 1826 have left the company's service. The increase in payroll due to the award of the War Labor Board on Oct. 2, 1918, and to supplementary awards is estimated to cost the company more than $4,000,000 annually.

IMPROVING SERVICE AND EQUIPMENT

Although, the trustees state, the service cannot be made satisfactory until new equipment is secured, improvements have been made from time to time in large number. The operating department of the company has been subdivided into six departments, at the head of each of which is a superintendent directly responsible to the general manager. This reorganization has been already productive of good. Daily trips on surface lines have been increased by the number of 817. The car-miles run daily have been increased by 8300 miles. Four miles of track have been rebuilt and 18.64 miles repaired on the surface lines at a cost of $620,974.

The number of cars owned by the company at the time of its latest annual report was 3332, of which 1356 were open cars and 1140 were small box cars. Only a limited number of the box cars are in use, and it is said that all should be replaced as rapidly as capital becomes available. The trustees at their first meeting in July purchased 200 center-entrance-motor cars and fifty trail cars at a total cost of $3,028,550.

On Jan. 11, 1919, a one-man car was put into operation on the Grove Street line, West Roxbury, to try an experiment and to familiarize motormen with the car. The trustees believe in the policy of introducing cars of this type in considerable number on lines that seem suited for their use. Six new steel elevated cars, purchased before the trustees took possession, have been put in operation. Work has been resumed on the thirty-five Cambridge Subway cars, delivery of which ought to commence this coming spring. The trustees found completed vestibules for articulating the 25-ft. box cars and have ordered the articulating of forty-eight cars to tide over until more new cars can be purchased.

Eighty motors for No. 1 semi-convertible cars have been purchased at a cost of $89,000, and 264 motors have been purchased for No. 3 semi-convertible cars at a cost of $225,000. Seventy air-brake compressors for No. 4 semi-convertible cars were purchased at a cost of $31,000. Six double-truck Russell snowplows have been added to the equipment. One hundred and eighteen cars have gone through the shop for general repairs and painting; 527 cars have been put through the shop for light repairs, and forty-three snowplows and sweepers have gone through the shop for general repairs.

In the opinion of the trustees, however, the Boston Elevated Railway still needs cars, power, track renewals, car shops and carhouse alterations, irrespective of any remodeling or change of present subways to provide for rapid transit trains and irrespective of extensions of the system.

The trustees propose that in the five years beginning with 1919 they purchase 600 surface cars. These, with the cars already ordered, would permit the retirement in 1919 of 625 of the oldest box cars and in

1920 the retirement of the balance of cars of that type now in use, besides providing for the addition of 100 more cars than are now operating upon the system. These additional cars, it is believed, should take care of the natural growth in population for 1918 and 1919. In 1921, 1922 and 1923, 100 cars should be added each year to take care of this growth and to make necessary replacements. The cost of this program is estimated at $6.800,000, in addition to the $3,700,000 for equipment already ordered.

The growth of business based on experience requires provision to be made for an annual increase of power production equivalent to 5 per cent of the maximum capacity of the system. In 1919 the trustees purpose to install a new turbine (already ordered), a rotary and stokers at the Lincon Power Station; to complete the Somerville substation; to install two rotaries in the Charlestown station, and to provide necessary conduit and cable construction. The estimated cost is about $1,000,000. A similar expenditure is proposed for each year for five years, or a total of $5,000,000 in five years.

John A. Beeler suggested that 23 miles of track should be rebuilt each year in addition to ordinary repair and maintenance in order to keep the roadbed in satisfactory condition at all times. To the extent that track is renewed with heavier rails, the cost is a charge to capital. That item, it is said, will require in five years approximately $2,000,000. There is also a most urgent need of a modern car shop. The company has land conveniently situated to accommodate both surface and rapid transit cars, and the trustees propose the erection and equipment upon it of a modern shop. All old shops will be abandoned except necessary emergency repair shops at carhouses, and these must be improved. A total of $2,500,000 is needed for car shops.

TABLE II—COST OF SERVICE OF BOSTON ELEVATED RAILWAY FOR DECEMBER, 1918

		Cost per Passenger, Cents
Operating Expenses:		
Maintaining track, line equipment and buildings	$135,085	0.483
Maintaining cars, shop equipment, etc.	214,889	.768
Power (including 28,480 tons of coal at $6.757, or $192,455)	287,011	1.027
Depreciation	167,000	.597
Transportation expenses (including wages of car employees, carhouse expenses, etc.)	778,294	2.784
Salaries of administrative officers	9,132	0.033
Law expenses, injuries and damages, and insurance	105,143	0.376
Other general expenses	96,635	0.346
Total operating expenses*	$1,793,189	6.414
Fixed Charges:		
Taxes, proportion for month	79,256	0.283
Rent for leased roads (exclusive of subways)	216,098	0.773
Proportion for month of rent of subways and tunnels to be paid to the City of Boston, which does not include Cambridge Subway owned by the Boston Elevated Railway	125,664	0.449
Interest on bonds and notes of Boston Elevated Railway	119,562	0.428
Miscellaneous items	3,249	0.012
Proportion of dividends under acts of 1918	116,997	0.419
Total cost of service	$2,454,015	8.778

* Of this total $1,095,251 represents wages, the total wage cost per passenger being 3.918 cents.

TABLE I—RECEIPTS AND COST OF SERVICE OF BOSTON ELEVATED RAILWAY FOR SIX MONTHS ENDED DEC. 31, 1918

Receipts		
From:		
5-cent fares—July, 2.89 per cent (decrease)	$1,525,538.09	
7-cent fares—August, 24.01 per cent (increase)	1,915,260.97	
7-cent fares—September, 12.33 per cent (increase)	1,722,738.34	
7-cent fares—October, 3.00 per cent (increase)	1,688,494.52	
7-cent fares—November, 21.03 per cent (increase)	1,919,914.47	
December adjustment of 7-cent fares	62,896.03	
8-cent fares—December, 36.33 per cent (increase)	2,234,532.17	
		$11,069,374.59
From operation of special cars, mail pouch service, express and service cars		64,918.36
From advertising in cars, on transfers, privileges at stations, etc.		146,465.86
From other railway companies for their use of tracks and facilities		25,163.53
From rent of buildings and other property		33,490.90
From sale of power and other revenue		65,615.91
Total receipts from operation		$11,405,029.15
Interest on deposits, income from securities, etc		48,738.87
Total receipts		$11,453,768.02
Cost of Service		
Operating expenses:		
Maintaining track, line equipment and buildings		$1,577,591.13
Maintaining cars, shop equipment, etc		1,162,415.01
Power (including 131,157 tons of coal at $7,475 or $980,454.83)		1,431,494.19
Transportation expenses (including wages of car employees, car-house expenses, etc.)		4,475,085.78
Salaries of administrative officers		50,456.72
Law expenses, injuries and damages, and insurance		554,334.11
Other general expenses		458,372.18
Depreciation		1,002,000.00
Total operating expenses*		$10,711,749.12
Taxes, proportion for six months		447,610.39
Rent for leased roads (exclusive of subways)		1,291,691.40
Proportion for six months of rent of subways and tunnels to be paid to the City of Boston, which does not include Cambridge Subway owned by the Boston Elevated Railway		738,918.16
Interest on Boston Elevated Railway bonds and notes		664,512.16
Miscellaneous items		13,716.55
Dividends paid under acts of 1918 Three and one-half months on preferred at 7 per cent Six months on common at 5 per cent		658,235.00
Total cost of service		†$14,526,432.78
Net loss for six months		†$3,072,664.76
Revenue passengers carried		162,964,817
Total receipts per revenue passenger (cents)		7.028
Cost of service per revenue passenger (cents)		8.914

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* Of this total $6,379,986.77 represents wages.

† Does not include $117,402.98 back pay covering period June 15 to 30, but paid during the months of November and December, 1918.

Moreover, the trustees remark, incidental changes will be incurred in carrying out the foregoing program. Additions to the signal system will be required; bridges must be strengthened, and thirty snow sweepers of the modern type and a number of auto trucks are needed. The cost of all miscellaneous items is estimated to be slightly in excess of $1,500,000 in five years. The total estimated capital expenditures in the year 1919-1923, inclusive, are $21,500.000.

MORE LEGISLATION IS NEEDED

One of the features of the electric railway situation in Boston is the extraordinary burden of subway rentals to be met from operating receipts. The trustees believe that to prevent deficits and eventually to secure a lower fare it is essential that at least while the public is operating its own railway this charge to operating expense should be removed. One of the bills now pending in the Legislature asks for relief from this burden.

The great need of additional capital has led the trustees also to recommend the sale of the Cambridge Subway. Such a sale would place the ownership of that subway in the hands of the public, where it should be and where the title to other subways has been kept. A bill has been presented in the Legislature to permit the sale and the transfer of the proceeds to capital uses for the benefit of the service.

It is reported that the Ministry of Reconstruction of Great Britain favors the development of an extensive system of light railways, largely for the purpose of transporting agricultural products. Track of 2-ft. gage, semi-portable in character and laid on the roadway, or on waste land alongside the roadway, has been proposed. The traction would be mainly by steam or electricity which would be supplemented by gasoline tractors or horses. Possibly by the use of "containers" it would be feasible to run loads from the "agrails" on the ordinary railways.

Electrical and Mining Engineers Get Together on Welding

A Joint Session of the A. I. E. E. and the A. I. M. E. Was Held in New York This Week in Connection with National Conventions of These Societies

THE American Institute of Electrical Engineers and the American Institute of Mining Engineers took advantage of the fact that the midwinter meeting of the former and the annual convention of the latter were scheduled to be held simultaneously in New York this month, to arrange a joint session on the subject of welding. The A. I. E. E. furnished two papers and the A. I. M. E. three, the principal points of which having relation to electric railway work being abstracted in the following paragraphs.

A paper dealing with the investigations undertaken by the welding committee of the Emergency Fleet Corporation was read by H. M. Hobart of the General Electric Company. In speaking of the various kinds of welding wire used Mr. Hobart said that these range all the way from the cheapest fence wire, costing but a few cents per pound, up to carefully treated and covered electrodes, which cost several times as much. As to bare electrodes, it is generally considered that uniformity is very essential, and it has been thought necessary to reject wire which has bad spots. It is now claimed that such material may be salvaged by dipping in milk of lime (whitewash) before welding. This dipping may be done in quantity and the coating allowed to dry, or the welder may keep a pot of the solution on hand into which the electrodes may be dipped immediately before welding.

ALTERNATING-CURRENT WELDING IS INCREASING IN FAVOR

In comparing direct current equipment with alternating current for arc welding, Mr. Hobart said that up to recently it had been contended that arc welding required a direct current supply, but now there are many advocates of alternating current. It is generally considered that it is a little more difficult to hold the arc where alternating current is used, but this simply resolves itself into a matter of practice. In regard to the frequency for alternating current arc welding, it is generally maintained that such welding is only thoroughly practicable with as high values as 50 or 60 cycles per second. There are, however, some who hold the opinion that the use of 25 cycles or less is equally satisfactory. With reference to the use of bare versus covered electrodes for alternating current arc welding, some maintain that flux-covered electrodes are best. A novice can learn to weld more quickly by employing flux-covered electrodes, but can ultimately learn to weld just as rapidly and successfully with bare electrodes. The difficulties lie in the initial stages of his education. As to the relative speeds of welding by the two processes, Mr. Hobart stated that the average speeds are about the same.

With reference to the comparative fields of gas and electric arc welding, it is generally considered that gas welding is more satisfactory for thin material, say ⅛ in. thick and under, and for general repair work, particularly where various kinds of steel and cast iron are involved. When it comes to depositing a large amount of metal and welding up structural steel or plates of ¼-in. thickness and upward, the results obtained by the ordinary direct current arc with the metal electrode are at least equal in quality to the gas welding work and they are certainly obtained more cheaply. The quality of the welds cannot be compared until certain elaborate tests of gas welds have been completed. The results will permit comparison with the considerable research data already obtained with regard to electric arc welds.

Mr. Hobart said that within reasonable limits the speed of welding increases considerably when larger currents are employed. It appears reasonable to estimate that this increase will probably be about 25 per cent to 35 per cent for large currents. This increase is not directly proportionate to the current employed, because with large current a greater amount of time is taken to insert new electrodes than with small current, and the operater is working under a more strenuous condition. Incidentally, the operator who employs the larger current will not only weld more quickly, but the weld will also have greater strength. In regard to the effect on arc welding of the voltage employed, tests demonstrate that it makes no material difference in the tensile strength, bending qualities, or appearance of the welded material.

With the advent of metal-arc welding there has been a tendency to neglect the carbon-arc method. It now appears that there is a definite field for the carbon-arc method. In general, this is not applicable to vertical and overhead welding. The majority opinion of competent observers indicates that carbon-arc welding is not as reliable as metal-arc welding because: (1) carbon is carried into the deposited material, thus reducing its ductility; (2) it is more difficult to obtain good fusion on account of overlapping of deposited metal on the original metal; (3) it is more difficult to manipulate and this requires greater skill; (4) the arc is much hotter, which means greater discomfort to the operator and, therefore, lower efficiency; (5) greater cooling spaces are developed because larger areas of adjacent metal are heated.

On the other hand, it is contended by some that carbon-arc welding can be developed to the point where these objections no longer exist, and the advantages of this method are assured, namely: (1) no preparation of the abutting edges is necessary; (2) greater rate of deposition of metal and, therefore, greater speed of welding is obtained, particularly in heavy work; (3) it has greater adaptability to automatic welding.

Much progress has been made in America in the use of spot-welding for the joining of plates. In making a fusion-weld, the cleaner the surface the better the weld. In spot-welding it is desirable to have clean surfaces under the electrodes, but scale between the two plates is a positive advantage. The extent of the field of the application for fusion and spot-welding is but little appreciated by engineers other than those who have been directly connected with welding development. It is evident that the field is an enormous one, as it includes all structures and apparatus where steel is employed.

SOME POINTS FROM THE OTHER PAPERS

In a paper dealing with welding as a process in ship construction, S. V. Goodall said that during the war welding had been resorted to in order to save time and economize in labor, but that cost was relatively unimportant. Now that hostilities have ceased, economy in first cost and maintenance becomes again of primary importance, economy of time and labor being of value only in so far as they result in cheaper production.

S. W. Miller, proprietor Rochester Welding Works, read a paper on "The Path of Rupture in Steel Fusion Welds." He said that the first evidence of strain in any weld is at the point where visible defects exist such as films of oxide around the grains or around small particles of metal. It appears that welding materials which are low in carbon give a much less columnar structure in gas welds than others, also in electric welds the structure is usually more columnar than in gas welds, although variations can be noted here also. It would appear that the rapid cooling of the electric welds is responsible for this, and that the slower cooling of gas welds probably makes the grain more nearly equiaxed. The quenching of electric welds appears to produce an entirely different structure. Here the grains loose their columnar nature and the lines entirely disappear. It seems quite clear that the only way to account for the brittleness in welds is to assume that it is caused by films of material at the grain boundaries. George F. Comstock, metallographist for the Titanium Alloy Manufacturing Company, discussed the points brought out in Mr. Miller's paper and added some further information regarding the identity of the needless or small crystals which are present in welds.

In a paper dealing with fusion in arc welding, O. H. Eshholz, of the Westinghouse Electric & Manufacturing Company, took up the effects of penetration, overlap and arc length on the quality of welds produced. He also gave some information regarding electrode material and diameters necessary for use with different values of current. In conclusion Mr. Eshholz said the fusion obtained in arc-welded joints between the plates and deposited metal is determined by the penetration of this metal into the plate metal and the overlap of the edge of the deposit layer on the plate. The penetration is comparable to the depth of arc crater as observed by the welder when moving the arc terminal over the plate with uniform velocity, and the overlap is indicated by the contour of the surface of the congealed deposit in the region adjacent to the material welded. He illustrated the relation between the depth of arc crater and the depth of the resulting penetration with several lantern slides. These showed sections through the crater obtained by breaking an arc during the process of depositing a layer of metal on a steel plate. The depth penetration was almost exactly the same as the depth of the crater and this followed a line of the same general form as the crater depression. For most welds, a depression of $\frac{1}{16}$ in. will give the desired penetration, while a contour which does not show a re-entrant angle between plates and deposit indicates an overlap per layer of approximately $\frac{1}{32}$ in. or less.

Thus by examining the surface and edges of the deposited metal a simple visual indication is given for gaging the penetration. The best welds show an intimate contact at the edges of the deposited metal and an entire absence of even the smallest re-entrant angle.

WHAT THE DISCUSSION BROUGHT OUT

In introducing the subject of welding President C. A. Adams, of the A. I. E. E., gave a brief summary of the work done by the welding committee of the Emergency Fleet Corporation of which he is chairman. He said that the advance made in electric welding during the past year had been as great as that of the preceding ten years. He also announced that a new welding organization is being started to continue the work begun by the welding committee and to carry on investigations necessary for the advancement of all classes of welding.

In the discussion of the various papers presented H. A. Hornor, consulting engineer, Philadelphia, Pa., spoke of the necessity of having skilled welders and told how those of the Emergency Fleet Corporation were instructed. He said that the various shipbuilders had selected the men whom they wished to have trained in welding and as a result all sorts and conditions presented themselves. Under the stress of war conditions the training, of necessity, had to be intensive, and very few exceptionally skilled welders were produced. From his experience Mr. Hornor said that the best arc welders are those with a very sensitive nature. To produce a satisfactory weld the welder must concentrate his whole attention on the work in hand and satisfactory work cannot be expected from men who have to dodge hot rivets and work in the constant din of a boiler factory.

A. M. Candy, Westinghouse Electric & Manufacturing Company, spoke briefly of the relative speeds of alternating and direct-current welding, and said that one of the greatest problems for practical welders is the selection of the most suitable arc current to be used. He referred to the depth of crater and the re-entrant angle discussed by Mr. Escholz as forming a basis for determining by visual means when a weld is good or bad. He said that this affords a means for the welder to determine for himself when he is doing good work.

C. J. Holslag, chief engineer Electric Arc Cutting & Welding Company, spoke of the relative speeds of alternating and direct-current welding. He said that in a melting test which he had conducted, with no attempt at welding, four units of metal had been melted by alternating current to three by direct current. He said that oxidization causes the weak points in most welds, and that the shorter the arc the less the chance for air to enter and produce oxidization, and the shorter the time that the molten metal is in contact with the air.

C. E. R. A. Accountants Reconvene

Delegates at Fort Wayne Meeting Lay Basis For Energetic Work After Suspension Caused by War

THE thirty-third meeting of the Central Electric Railway Accountants' Association was held at the Hotel Anthony in Fort Wayne, Ind., on Feb. 15, with sixteen members present. Most of the time was taken up with the presentation of addresses and lively planning for the future work of the association.

In his presidential address A. C. Van Driesen, secretary Toledo Railways & Light Company, Toledo, Ohio, directed attention to the fact that the last real meeting of this association was held in Cincinnati in December, 1916. Since that time there have been many changes in the personnel of the association, many members resigning to accept positions with industrial concerns. On account of no conventions having been held, it appears that a state of "dormancy" has enveloped the association, to the extent that in some quarters the members have expressed the sentiment that the object for which the association was organized has been accomplished and it should be disbanded. Others are luke-warm and do not seem to care one way or the other.

In regard to this point Mr. Van Driesen said in part:

> Do we really think that the entire object for which this association was formed has been accomplished? If so, then by all means disband. It seems to me, however, that with the multitudinous problems which are now confronting every industry in this country, the electric railway is at last about to come into its own. If this conclusion is correct, the Accountants' Association should be ready at all times to step into the breach and assist to the fullest extent of its powers the operators and managers of the various properties. Moreover, as we are enabled to acquire knowledge from our personal relationship with other men in the same line, the association should continue for the interchange of ideas and for more intimate personal relations.
>
> While the association has done good work in the past, the opportune time to show its mettle is now; it should get into this reconstruction period with a vim and do all in its power to solve the various problems as they appear. There will be plenty for us to do, and closer personal relation will be one of the ways in which we will be enabled to solve some of our problems.
>
> Although the constitution provides for only two meetings each year, it might be amended to provide for four meetings, February, May, August and November—the August meeting to be held at Detroit, Cleveland or Toledo or some other lake point and the remainder of the meetings to be held at the most central point to be decided upon at the previous meeting.
>
> It seems to me that now is the time to make up for lost motion during the last two years by holding more meetings, putting more "pep" into them and having an association that is alive and up to the minute, rather than one that is dying of dry rot.

The address at the morning session, on the subject of "Where the Money Comes From," was made by C. B. Kleinhans, auditor Toledo & Indiana Railroad, Toledo, Ohio. Mr. Kleinhans explained that the form of borrowing which an electric railway puts into effect may be through short-term notes issued by local banks or through bonds.

The local banks, he said, will often loan reasonable sums of money based upon the company's credit, but these loans are usually made for short terms of from thirty to ninety days. As such a note falls due banking laws very generally require that the note shall be reduced by a substantial payment before renewal. In many cases if money is scarce and the interest rates high, the bank prefers to conserve its resources by keeping its outstanding loans at a low point. Therefore, the most advantageous form of loan is to issue bonds, which are long-term certificates.

It can be conservatively stated, according to Mr. Kleinhans, that 50 per cent of all financing is in the form of bonds. Continuing he said:

> In order to float a security issue of any kind at the present time, it is first necessary to secure the consent of the Public Utilities Commission. But another difficulty exists, for in order to float a bond issue it is necessary to establish a credit rating with the banking industry and to demonstrate that the company has the ability to earn not only the interest on the securities about to be issued but also an additional amount over and above the interest which will permit the utility to retire a substantial amount of the bonds each year and also to pay the principal of the outstanding balance at maturity.
>
> If the utility can demonstrate that it has the earning capacity to warrant the issuance of a block of bonds sufficient to provide funds for the construction work in question and the restrictions of the bankers for the protection of the security holders can be complied with, the utility may procede with its additions and extensions, provided it can raise first the money to finance the work until bonds can be issued to reimburse the treasury for the money so expended. For it must be borne in mind that construction work must be paid for before it can be mortgaged, and the only means the utility has of paying is from the limited surplus earnings and through short-term loans from local banks.
>
> Here are some of the "restrictions" that may be imposed upon the utility in borrowing money. It may be required that:
>
> The net earnings be from one and one-half to two times the interest charged.
>
> The utility contract that it will not borrow from any source unless the securities outstanding are amply protected.
>
> Bonds may be issued to an amount not to exceed 75 per cent of the original cost of construction, and as such bonds are usually sold below par, the balance must be put back out of "surplus earnings."
>
> The sinking fund, to be paid out of "surplus earnings," must redeem a specified block of bonds each year.
>
> These are but a few of the many things the utility may be required to do before it can pay dividends to the stockholders. It is entirely possible that some of the passenger cars may be crowded and available freight equipment worked to full capacity, but the cost of operation be so high as to make the net return almost a minus quantity. If the net return is small, it will be hard to borrow money, and consequently extensions and improvements must be curtailed if not stopped altogether.
>
> It is a very erroneous impression that the securities of large corporations are owned by multi-millionaires. A man with a great deal of money can engage in business that will bring him in larger returns than he can get by purchasing bonds. While we do not wish to give the impression that men of large means do not purchase bonds, yet the greater part of the bond issues of the large companies, we believe, are held by the public at large or for their benefit, in the case of savings banks, insurance companies, trust funds, etc.
>
> It is considered quite the thing at the present day to attack the railways through Councils and newspapers when other subjects grow tame. The very men who are loudest in their denunciation of "those who fail to do their duty for the uplift of the public at large" are the ones who attack the public utilities upon the slightest provocation. Hundreds of these men are savings bank depositors, and the safety of the money they have so deposited may be guaranteed by the securities of the corporation which they are endeavoring to put out of business. It does not seem reasonable that men would seek to jeopardize their own interests and it is very unlikely that they would do so if they understood the facts.

The following officers were elected, and the following committees then appointed for the new year:

Officers: President, A. C. VanDriesen, secretary Toledo Railways & Light Company; first vice-president, C. B.

Kleinhans, auditor Toledo & Indiana Railroad; second vice-president, J. B. Hooper, Detroit United Railway, and secretary-treasurer, A. L. Neereamer, Central Electric Railway Association.

Executive Committee: Officers and H. F. McColgin, Indianapolis & Louisville Traction Railway; L. W. VanBibber, Ohio Electric Railway; E. O. Reed, Western Ohio Railway, and Walter Shroyer, Union Traction Company of Indiana.

Compiling Committee: L. T. Hixson, chairman, Terre Haute, Indianapolis & Eastern Traction Company; I. E. Guthrie, Interstate Public Service Company; H. F. McColgin, Indianapolis & Louisville Traction Railway; A. R. Baxter, Indianapolis & Cincinnati Traction Company, and A. L. Neereamer, Central Electric Railway Association.

Constitution and By-Laws: A. R. Baxter, chairman, Indianapolis & Cincinnati Traction Company; O. A. Small, Chicago, South Bend & Northern Indiana Railway, and J. P. Longon, Cincinnati & Dayton Traction Company.

Freight and Express Accounts: Walter Shroyer, chairman, Union Traction Company of Indiana; L. W. VanBibber, Ohio Electric Railway, and G. B. Dobbin, Michigan Railway.

Light and Power: H. T. Ledbetter, chairman, Toledo Railways & Light Company; James Sweeney, Northern Ohio Traction & Light Company; Karl A. George, Indiana Railways & Light Company; H. E. Vordermark, Fort Wayne & Northern Indiana Traction Company, and J. S. Minary, Benton Harbor-St. Joe Railway & Light Company.

Membership: O. A. Small, chairman, Chicago, South Bend & Northern Indiana Railway; C. B. Baker, Toledo, Bowling Green & Southern Traction Company, and J. F. Stratton, Louisville & Northern Railway & Lighting Company.

Program and Arrangement: E. O. Reed, chairman, Western Ohio Railway; J. B. Hooper, Detroit United Railway, and G. H. Wilson, Evansville Railways.

Readjustment: W. H. Forse, Jr., chairman, Union Traction Company of Indiana; James Sweeney, Northern Ohio Traction & Light Company, and Irwin Fullerton, Detroit United Railway.

It was decided that the association would hold the next meeting at Springfield, Ohio, on May 24, and a meeting in Toledo, Ohio, on Aug. 22 and 23. It was also decided that the majority of the time at the next meeting would be devoted to the question box. Questions are to be submitted to the secretary, and these are to be printed on the program without the name of the company being mentioned and are to be answered in open meeting.

Progress in Solving Traction Problems

In commenting on the electric railway situation for the coming year, M. R. Bump, chief engineer of the Doherty organization, recently made a statement in part as follows:

"The great traction problem remains unsolved, but material progress, we believe, is being made toward its solution. Recent court decisions seem to point to relief in many localities, but we believe the ultimate solution of this problem lies in a more equitable system of charging for street car service. The straight fare as at present almost universally in use has many objectionable features; the zone systems adopted in many localities have been only a slight improvement on the former system.

"We believe that the ultimate solution of this problem lies in a method of charging in proportion to the length of haul, thereby not discriminating against the short-haul rider, permitting costs to be equitably distributed, and collecting from each customer a proper fare in proportion to the amount of cost that is occasioned by him."

AMERICAN ASSOCIATION NEWS

N. W. Bolen Elected President at Newark

AT THE ANNUAL meeting of the Public Service Railway company section held on Feb. 14 at Newark, N. J., N. W. Bolen, general superintendent, was elected president of the section. Other elections were as follows: Vice-president, H. M. Ehlers (formerly secretary), clerk in the general superintendent's office; secretary, A. H. Nelson, engineering department; directors, Charles F. Bachman, division master mechanic Essex division, and J. E. Rutledge, engineer distribution department. In his annual report Retiring Secretary Ehlers said that the present membership is 362, made up as follows: Transportation, 182; mechanical, 37; distribution, 21; engineering and maintenance of way, 28; claims, 20; auditing, 23, and general, 51. The attendance at meetings during the year has averaged 218 although this average must be considered in the light of the fact that one very large general meeting was held. In taking the chair at the close of the meeting Mr. Bolen expressed himself as confident that the section will resume its pre-war vigor, that the programs for 1919 will be attractive enough to bring in the men from the outlying divisions, that the talks will contain solid information as well as entertainment and that the social features of the meetings will be very attractive. He used the expression "fill the house" as one suggestive of a successful coming year's work.

Research Bureau Established at Milwaukee

A NEW department known as the Operating Research Bureau has been established by the Milwaukee Electric Railway & Light Company for the purpose of carrying on certain of the functions of the management dealing with the research work required by the company and its subsidiaries. The work of the bureau will be confined largely to investigating and standardizing existing profit-sharing plans with a view of profiting by past experience.

Extensive and comprehensive study will be required to place all plans on a basis which will, in so far as possible, recognize individual effort to a greater extent. The bureau will co-operate with the various departments in devising, where practicable, new plans for profit sharing in divisions not now participating. It will prepare monthly the summary of the results achieved under the profit-sharing plans in each department and comment thereon in a monthly report, the data for which will be obtained from the representatives appointed in each department to co-operate with the bureau in its activities. The bureau will also assume charge of all valuation work, in connection with which unit costs will be developed. Such cost information is to be checked in a manner suited to the use of the various departments for estimating purposes. Time studies will also be made and the facilities therefor developed.

The Operating Research Bureau is under the direction of William Baum, research engineer, and Ralph Moody, assistant research engineer.

Convenient Testing Room for Air-Brake Valves

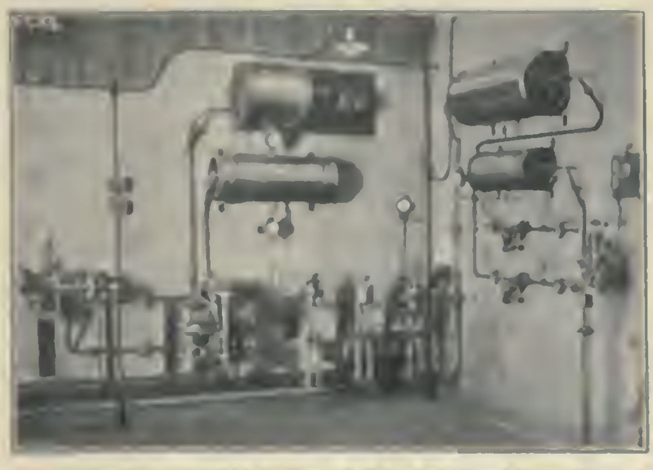
The Necessary Equipment for Testing Different Types of Brake, Triple and Feed Valves Is Arranged as On a Car

THE air brake testing equipment used by any railway depends to a large extent upon the size of the property or upon the number of cars equipped with automatic valves but it also depends somewhat upon the man in charge of this particular department. A very efficient and complete layout is in service at the shops of the Northwestern division of the Chicago Elevated Railways. There are 613 cars equipped with automatic air brakes which come under the supervision of this shop.

REPAIR SHOP END OF THE CHICAGO RAILWAYS' TESTING ROOM

The layout shown in an accompanying illustration is arranged just as on an electric car and is for the testing of brake valves, triple valves, feed valves and type J governors. It will be noted that there is provision for three types of brake valves. Those shown are, reading from left to right in the illustration, the M-1, the M-15-C and the M-23, all of which are in service on this property. At the left of the brake valve testing stands is the U-4 Universal valve testing equipment and at the left of this the equipment for testing the R-1 triple valves. The arrangement of the quick-action closing and opening gage on the U-4 triple valve, the air-brake cylinder and the auxiliary reservoir with gage needs no explanation.

On the right wall is the equipment for testing the feed valves and at the extreme right is a type J governor being tested. This is left on test for a day or two. It will be noted that two feed valves can be tested at once if desired. A feed valve is put on and the cut-out cock at the left is opened. The pet cock at the right is then opened and the feed valve is vibrated for ten minutes to loosen it up. The cut-out cock at the right of the pet cock is then opened and the feed valve adjusted to show 70 lb. on the gage at the left of the reservoir. The pet cock from the reservoir is then opened and if the feed valve responds at a 2-lb. reduction it is "O. K. for service." If the piston is loose the feed valve will not respond at a 2-lb. reduction and needs further attention. The compressors for all this equipment are located on the floor below.



TESTING EQUIPMENT FOR AIR-BRAKE VALVES, CHICAGO ELEVATED RAILWAYS

VARIOUS TYPES OF VALVES, TESTED, REPAIRED AND READY FOR SERVICE

The work bench, where all the valves are repaired and put in order, is located just at the left and is shown in another illustration. Everything is orderly and neat and was not arranged for the picture. When the various kinds of valves are repaired and ready to go back into service they are placed on racks just at the right of the testing equipment.

This testing and repair room measures about 28 ft. x 34 ft. and one corner is partitioned off as a private office about 12 ft. x 15 ft. The shop force includes one foreman and two men. Pumps and pump armatures are also handled in this department and this requires the services of two pipe fitters additional.

Bonus Reward for Careful Firing

In the issue of the ELECTRIC RAILWAY JOURNAL for Feb. 8 the practice of the Denver Tramway in rewarding men in the power plant for careful operation was described. The principle of the bonus for this purpose in one form or another is coming into considerable use. For example, in a large chemical works in Brooklyn, N. Y., watch engineers are paid a bonus of 10 per cent of their pay if they maintain an average evaporation rate of 8.4 lb. of water from and at 212 deg. Fahr., per pound of coal. The fireman's bonus in turn depends on the maintaining of an average CO_2 percentage of 11.6 as shown by analysis of gas drawn continuously during each watch. Coal passers receive a bonus if they keep the firing floor in good order and lose no time. This boiler plant consists of two 380-hp. boilers with Westinghouse underfeed stokers and forced-draft blower, and eight 150-hp. hand-fired boilers which serve largely as a standby. Bituminous run-of-mine coal is burned.

Preventing Theft of Rail Bonds

The Losses from Theft and Loosening of Bonds Are Greater with the Exposed Type, But Track Construction and Maintenance Difficulties Cause This Type to Be Favored

BY G. H. MCKELWAY
Engineer of Distribution, Brooklyn Rapid Transit System

TO THE average man, not connected with an electric railway, there is practically nothing so unfamiliar as a rail bond. And even to many track men, especially the old-timers of the "practical" sort, the value of bonds is but little clearer. To their minds the bonds are only of theoretical value and from the practical standpoint they are a nuisance. All can remember occasions when the cars operated over unbonded track and everything worked smoothly, so why go to the trouble and expense of installing bonds when they are only in the way when the joints have to be repaired? That is, if they have not been stolen before the time comes when the joints need attention.

Even those who appreciate the value of good bonding are apt not to think enough of the bonds to impel them to keep the bonds in good condition, as this requires continued watchfulness, testing and repairing or renewing. On many roads no attention is paid to the bonds once they are put on, and the result is too often found in electrolysis trouble or the complaints of "weak power," which latter condition is often improved by the running of additional and unnecessary copper on the positive side of the system instead of making repairs to the negative returns.

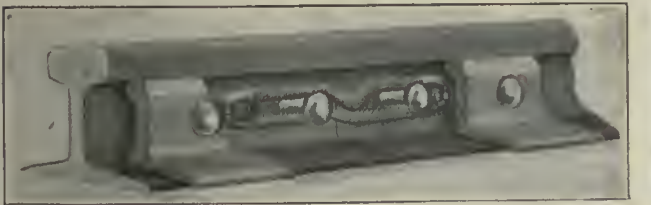
There have been so many different types of rail bonds tried out that it is difficult to divide them into sharply defined classes, as one bond may have one or more characteristics of several of the classes. As a beginning, however, we may divide them into those which are installed under the plates and those which are installed outside of the joints.

The primary reason for placing the bonds under the plates is to protect them against theft or accident, generally the former. In addition the protected bond is generally shorter than the other type and is therefore cheaper and of lower resistance than the long bond. This is always true if the bonds are attached to the web of the rail but is not necessarily the case if the bonds outside make contact with either the head or the base of the rail.

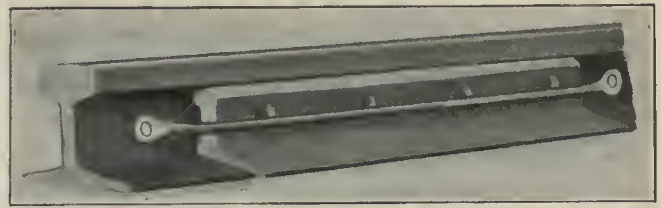
To be absolutely protected against theft not only the bond itself but also its terminals should be placed under the plate, as otherwise the thief will cut off the terminals and pull the bond out from under the plate. Sometimes this procedure is varied by cutting the conductor in only one place and then punching out the terminals, in which case the thief adds the weight of the terminals to that of the other stolen copper. This is an unusual refinement, however, as he seldom wishes to be burdened with both a chisel and a punch. When they are used there is generally proof of an "inside job," that is, that the bond has been stolen by an employee of the road who has access to the tools.

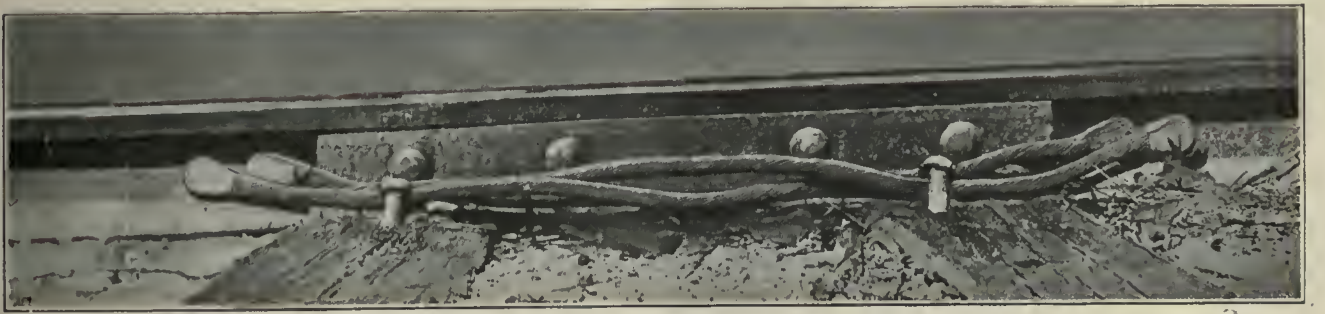
While attempts have been made to protect bonds installed outside of the plates by bolting covers over them and by stapling long bonds down to the ties, such attempts have been only partly successful, although of some value. Most of the covers do not extend over the terminals, so are open to the same objection as plates which do not protect the terminals. Again, the covers are generally fastened on by means of the track bolts and therefore interfere with the tightening of the lat-

A RAIL BOND OF THE PROTECTED TYPE



THE EXPOSED-TYPE RAIL BOND





LONG BOND SPIKED TO TIES TO PREVENT THEFT ter, or they add a part which must be removed and reinstalled when the splice bars are taken off. There is the further objection that either the bond must be installed at the same time as the plates, or the latter must be loosened up by the removal of the nuts to permit of the covers being put on.

So far as the use of nails or staples is concerned, it is seldom that the former are of any value as they are too easily bent out of the way, often merely by pulling on the ends of the bond after the terminals have been cut off or punched out of the rail. Staples are much to be preferred to nails, but unless long and strongly made they can be pulled out of the tie, and unless driven tightly against the bond the latter can be pulled out from under them after the terminals have been cut off. If the staples are driven in firmly there is danger of their cutting or breaking some of the strands of the bond. Even if that is not done the bond is tightly fastened to the tie so that only short free ends remain, and so far as withstanding vibration and creepage is concerned, the long bond is no better than a short one and its life is much less. If the long bond is stapled to the tie at only one place, the bond, of course, has much greater freedom of movement than is the case when more staples are used, but it is much less safe against theft, as it is only necessary to cut it close to the staple as well as at the rail and then secure two fairly long lengths of bond. It is also much easier to pull up a single staple than two or more. At times spikes are used for fastening down the bonds, instead of nails or staples, and, while there is no danger of their being bent or pulled up they are more expensive and have the same faults as the staples.

From the foregoing arguments it might be thought that the protected type of bond is to be preferred to the exposed type. So far as protection from theft is concerned that is the case and probably, if the bond could be considered only in its relation to the return circuit, the protected type would be used almost exclusively. But the bond is so intimately connected with the remainder of the track that thought must be given to its influence on the construction and maintenance of that too. In the track department opinion will be found to favor the bond which is placed outside the plates. The long bonds can be put on at any time after the rails are in place and do not require that the bonders work with the trackmen and install the bonds after the rails are spiked to the ties and before the joint plates are bolted up. When the work of two different gangs of men depend on each other there is sure to be delay from one of them waiting until the other does its part. If the bonds are long enough the plates can be taken off without disturbing them and can be replaced without any care in placing the strands safely around the bolts so that the bonds will not be "pinched."

If the terminals are attached to the rails by means of holes drilled in the webs, protected bonds require the drilling of these holes close to the bolt holes and so further weaken the rail under the joint, just where it receives the severest pounding from the car wheels. The writer knows of one large system where the breakage of rails at their ends was traced, in many cases, to the use of short bonds and the consequent weakening of the web by the holes for their terminals. As a result, such bonds are no longer permitted in the rails and all bonds must be installed outside the plates.

Sand Car Requiring Little New Material

AT THE Wolf Street shops in Syracuse the mechanical department has just rigged up two very effective sand cars out of two antiquated single-truck cars.

In each body two sand boxes of the form shown in Fig. 1 were placed in such a way as to permit ingress and egress through a left-hand door at each end. Each box was made of 1¾-in. hard pine, 15 ft. 3 in. long, 2 ft. 3 in. wide and 3 ft. 6 in. high, outside dimensions. Inside it was provided with sloping sides and bottom converging toward a perforated sheet-iron cylinder in the center. A ½-in. staybolt, about midway on each end of the box, reinforces it against bulging.

The 6-in. sheet-iron cylinder, perforated with ½-in. holes on about 2-in. centers, reaches from the bottom to the top of the box. Its purpose is to limit the rate of flow of sand to the valve and prevent packing. The valve is simply a conical plug, with a suitable guide, fitting into the flared upper end of a 1½-in. pipe which leads to the rail almost directly below. This pipe is braced to the truck frame.

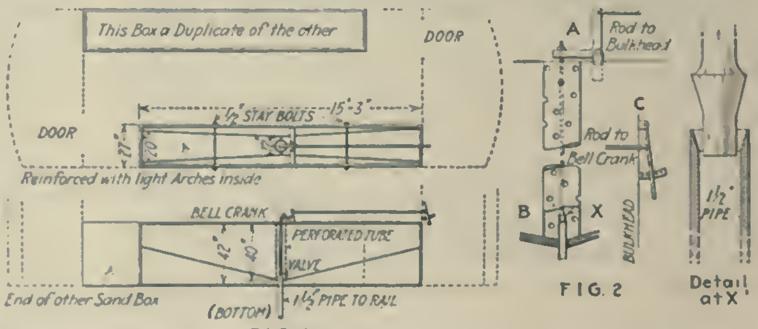


FIG 1

FIG. 1—DIAGRAMMATIC SKETCH, ROUGHLY TO SCALE, OF SAND BOXES INSTALLED IN SINGLE-TRUCK CARS AT SYRACUSE, N. Y. FIG. 2—DETAILS OF THE VALVE AND AUXILIARY MECHANISM

The valve is operated through a vertical rod attached to one limb of a bell crank, to the other limb of which is attached a second rod leading to an adjusting lever on the outside of the bulkhead. This lever swings over a sector provided with plug holes by means of which the valve can be set and held at any desired position.

Besides the addition of the sand boxes the windows of the cars were boarded up and the bodies and trucks were freshly painted.

New Type Malleable Pin for Crossarms

A specially constructed malleable pin for use on angle crossarms has been placed on the market by the Drew Electric & Manufacturing Company of Indianapolis, Ind. This pin is designed to permit locking over the angle by a flange which holds the pin firmly against strain in any direction. The insulator is cemented to the pin which can be quickly and rigidly bolted to the arm. Two sizes are offered—1-in. and 1⅜-in. diameter head.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

San Diego Wages Not Low

Company at Hearings Before the War Labor Board Shows that the Employees Are Generally Satisfied

At hearings before an examiner of the National War Labor Board during the last week in January officials of the San Diego (Cal.) Electric Railway refuted serious charges made by the employees. This was done without the company acknowledging the jurisdiction of the board, in any way, the submission of the men's complaint on Dec. 24 not having been joined in by the company.

Collective Bargaining Demanded

The demands of the members of the union were for collective bargaining; an increase of wages to 40 cents an hour for extra men and 50 cents an hour for regular platform men; an eight-hour day with thirty minutes leeway; the reinstatement of six men who are alleged to have been discharged for affiliating with the union, and improved working conditions.

The company said that it had refused to receive a committee elected or selected by Division No. 826 of the Amalgamated Association of Street & Electric Railway Employees of America. On the other hand it had never refused to receive a committee of employees up to the time of this complaint.

William Clayton, vice-president of the company, denied that wages were inadequate to maintain the standard of living in San Diego. The wage scale of 40 cents for the first year and 45 cents thereafter, with 3 cents additional for motor-conductors, is higher than the 38 cents to 42 cents granted by the board in the New Orleans case and many other cities, where climatic conditions alone are not nearly so favorable to street car operation as in San Diego. Moreover, it was averred, the majority of the platform men in San Diego are fully satisfied with the wage scale now in effect. The company has been refusing for some time past to receive any more applications for employment on the cars. The company showed that the present railway wages are on a scale above the average for seventeen other lines of work in the community.

Men Discharged for Cause

M. J. Perrin, superintendent, showed that the six men had been discharged for actual and long-continued violations of the rules, and that no intimidation had ever been employed. That letters upon dismissal had been refused because the applicants were union men was asserted to be absolutely unfounded.

To show the financial condition of the company, it was explained that the loss for the year ended Dec. 31, 1918, exclusive of dividends to the stockholders, amounted to $243,000. The estimated deficit for 1919 is $394,000. If the same number of cash fare passengers as estimated on the present 5-cent fare would travel in 1919, a 50 per cent increase in the cash fare would be sufficient. The experience of other properties however, was said to indicate that instead of a theoretical increase of 50 per cent there will be a much smaller percentage on account of a decrease in the number of passengers traveling. Consequently, it will require an increase of 90 per cent to 100 per cent in the cash fare in order to pay operating expenses, replacement reserve, taxes and interest on bonds.

Says Industry Is Decaying

Spokane Commissioner of Public Utilities Raises Question About Autos Supplanting Electric Cars

In a report made on Feb. 6 to the City Commissioners of Spokane, Wash., C. M. Fassett, commissioner of public utilities, stated that in his opinion public purchase of the electric railway lines in that city would not now be a good business proposition. Mr. Fassett said in part:

> It seems certain from what I can learn that the street railway business is a decaying business, and that this condition is fast getting to be recognized by the students of municipal life and also by the owners of the car lines everywhere. It is very doubtful if capital invested in this business should be salvaged either by a guarantee by the public of the investment, or by public purchase.
>
> Some students of urban transportation believe that in the near future it will be carried on rubber-tired vehicles, not on rails. If this be true, any municipality which buys a street car line at anywhere near its cost, or which guarantees its earnings, is getting the proverbial gold brick.

Mr. Fassett stated that the studies now being made in the department of public utilities point to the probability that the transportation problem in Spokane can be handled by 150 auto buses on routes totalling about 100 miles, as against the existing 129 miles of electric railway lines. The department believes that these buses can be bought for $6,000 each, and that the complete outfit, including shop and storage facilities, can be covered by an investment of $1,500,000, as against the investment of $6,750,000 for the electric lines. This special aspect of the problem, it was said, will be the subject of a further report to the City Council when the investigation is completed.

Taxation to Aid Rider

Massachusetts Commission Reports to Legislature on General Situation and Case of Bay State System

At the request of the Massachusetts Legislature, expressed in a resolution adopted on Jan. 24, the Massachusetts Public Service Commission has surveyed the condition of the Bay State Street Railway and of other electric lines in the State, and now recommends the use of taxation to reduce the burden of the car riders.

Amend Public Control Act

In regard to the Bay State system, the commission recommends that the public control act for this company be amended to provide that the first 5 cents of the cost of service per passenger be paid by the car rider and that any additional cost be paid 50 per cent by the car rider and 50 per cent by general taxation. The commission believes that this will prevent the fares from going above the present level and both fares and taxes will be gradually reduced as the trustees who are responsible for operating the railway system are able to decrease operating costs.

In regard to the general situation, the commission says that the first necessary step is the removal of the burden of special taxes and public charges upon the railways, and a draft of a bill to this end is submitted. But relief of this character, it is believed, will go only a short way toward meeting the absolutely essential revenue requirements. The commission is therefore convinced that direct community contributions through the tax levy is the only practicable way out of the present difficulty.

Fare Should Meet Cost of Service

It is said that fares should be fixed so as to meet the cost of service in so far as this may be done without unduly hampering or discouraging the free movement of traffic and the economic development of the communities served and otherwise injuriously affecting the general public interest. If the fares thus established do not yield sufficient revenue, the balance should be met by an addition to the tax levy up to a reasonable maximum, which is suggested as $2 for each $1,000 of assessed valuation. Any such appropriation should be coupled with public control.

A draft of a bill embodying this general plan and effective until December, 1922, was submitted by the Public Service Commission.

Buffalo Stage All Set

International Railway and City Prepared to Act Toward Ending Differences

Peter Witt, Cleveland, Ohio, has been selected by the City Council of Buffalo, N. Y., to represent the city on the board of arbitration which will formulate a plan whereby the International Railway, Buffalo, will be placed under municipal control. James E. Allison, Jr., St. Louis, will represent the railway. These two arbiters will select a third member of the board. If no agreement can be reached, some Supreme Court justice will designate the umpire. Mr. Witt will be paid by the city at the rate of $150 a day.

WILL SELECT THIRD ARBITRATOR

The selection of the third member of the board of arbitration will mark the completion of the first advance step taken to solve Buffalo's traction problems. Under the provisions of the agreement between the municipal authorities and the International Railway, neither side is bound by the decision of the board, but it is generally accepted that the findings of the board will be used as the basis for a permanent agreement between the city and the company whereby the service-at-cost plan will be adopted in Buffalo and the railway operated under the control of the city.

The first task for the board of arbitration is to fix the valuation of the company's property within the city of Buffalo. Figures have been presented by the city and company and have been practically agreed upon, except for certain intangible items, contractors' profits, depreciation and a few minor points. The sum thus suggested is $22,624,873. This figure is being used in the preliminary negotiations.

The company has secured a loan of $425,000 with which it has paid the interest due on Nov. 1, 1918, on its issue of $16,735,000 of 5 per cent refunding and improvement bonds. It is believed that a permanent agreement will be reached before interest due on May 1, 1919, becomes payable.

LEGISLATIVE ACTION NECESSARY

Some legislative action is necessary to stop the special referendum election which is scheduled to be held on March 25 on the question of whether or not the voters shall repeal the action of the City Council in granting a 6-cent fare to the railway with a 1-cent rebate slip pending the determination of a just and reasonable fare within the city by the Public Service Commission of the Second District. Referendum petitions were circulated soon after this action was taken by the Council and the fact that more than a sufficient number of signatures were secured forestalled the putting of this resolution into effect. The time limit has passed within which the Council can rescind its action so that legislative action is necessary in order to stop the referendum. The referendum would cost about $50,000. The action of the Council would be repealed by an overwhelming vote, probably larger than it was at the first referendum, and it is because of this fact that the city would seek legislative action to stop the referendum. That would automatically rescind the Council's action.

The International Railway has scored in its effort to have the Public Service Commission investigate the rates charged by the company in Buffalo with a view of securing a higher fare. The proceeding was started several years ago by the city to force the company to give service for a 3 or 4-cent fare. The company at that time secured an injunction restraining the commission from hearing the city's complaint because the company had a franchise with the city allowing it to charge a 5-cent fare. When conditions became such that the city saw that it would fail in the investigation and that probably a 6-cent or 7-cent fare would result the proceedings were dropped.

COMPANY WILL APPEAL CASE

Application was made three weeks ago before Justice William P. Rudd in the Supreme Court at Albany by Henry W. Killeen, of counsel for the International, seeking a writ of mandamus directing the commission to receive the company's answer. To this application the city entered a vigorous protest. Justice Rudd has held that the commission must receive the company's answer. This places the case squarely before the Public Service Commission for investigation. The city announces it will appeal to the Appellate Division of the Supreme Court. On behalf of the railway, Mr. Killeen, of counsel, says that the company will make no determined effort to bring the rate case before the commission until after the determination of the arbitration proceedings instituted by the city and the company to bring about a permanent agreement based upon the service-at-cost plan.

A Plea for a Square Deal

A. W. Harris, president of the Harris Trust & Savings Bank, Chicago, Ill., charges business men of that city with failing to back the efforts of public utilities to secure living rates. He says business men of Chicago and the country generally are woefully neglecting to support some lines of business and in a way "knocking" others. He is quoted in part as follows:

> It strikes me as peculiar that business men generally don't see the equity of supporting the so-called public utility companies in the efforts to secure more revenue. All other lines of business, it is granted, must raise prices if they are to live nowadays, yet gas, street railways, steam railroads and all similar forms of semi-public utilities are denied the right of living. These public utilities companies, electric railways in particular, are like a dying man. If they cannot get relief they must expire, yet the business interests are willing to allow this death simply because there was a contract that prevented the dying man being given more than a certain amount of food a day. Our business associations can easily get at the facts of the income and outgo of the public utilities, and once convinced of the justice of their contentions they should stand behind them. I think such a move by the Chicago Association of Commerce would have a tremendous effect in enlightening the public and enable it to see the justice of the contention of public utilities for higher rates.

Detroit Offers to Buy

City Suggests $29,653,936 as Price for Railway Property It Desires to Acquire

The first meeting of the new city officials of Detroit, Mich., the street railway commission of that city and the representatives of the Detroit United Railway took place on Feb. 11. Present at the conference were Mayor Couzens, the entire membership of the street railway commission, M. M. O'Shaughnessy and H. M. Brinckerhoff, appraisal experts for the city, Frank W. Brooks, president of the Detroit United Railway, A. F. Edwards, vice-president and treasurer of the company, and Elliott G. Stevenson, attorney for the company.

The conference had to do with the announced determination of the city through its new city administration to arrange, if possible, for the purchase of the lines of the company within the present 5-cent limits. The representatives of the city stated that the purchase would be considered only upon the basis of the physical valuation and not upon any basis of reproduction as a going concern. Mr. Brooks replied to the effect that the railway and its directors would do all in their power to come to an amicable and just agreement.

Actual figures of valuation and the purchase price were not discussed at this meeting. Later, however, an offer of $29,653,936 was made on behalf of the city for the property of the railway within the 5-cent zone.

Mr. Brooks made it plain that the company's representatives would not recommend acceptance of the city's offer and that they would present to the directors and shareholders all the facts which the street railway commission had laid before them.

Mayor Couzens said that the appraisals by the city showed the value of the system which the city desired to acquire to be about $27,500,000. This figure was based on average prices over low periods of cost of materials and labor. To this sum the city later decided to add $2,000,000, on account of new conditions that had arisen since the appraisals were made.

On Feb. 18 Mr. Brooks wrote the city that it was the opinion of the stockholders and the directors that the value fixed by the city was inadequate. The company suggested as an alternative a price of $33,500,000 or a lease to the city for a period of fifty years on a rental tentatively fixed at $2,010,000 per annum—6 per cent on a valuation of $33,500,000.

All Seattle Rides Again

Electric railway service in Seattle. Wash., has been restored to normal on the lines of the Puget Sound Traction. Light & Power Company, Seattle & Rainier Valley, and municipal system, following the cessation of the general strike called on Feb. 6. The return to work on Feb. 9 of the trainmen of the Puget Sound Traction Company was the beginning of the end of the general strike. Other unions rapidly fell in line and their members returned to their respective employments. In a statement to the general strike committee the members of the trainmen's union said that they had done what they set out to do, namely, assisted in showing the solidarity of labor. During the strike period, the only attempt at vandalism was made on the municipal railway. Some one familiar with the mechanism of the municipal cars tampered with the electrical machinery on the eight cars of the Lake Burien line, with the result that service was crippled for one day.

News Notes

Another Service-at-Cost Suggestion.—A committee of the Board of Trade of Louisville, Ky., is inquiring into service-at-cost operation with a view to the possible application of this plan to the Louisville Railway.

M. O. Bills Appear in New Jersey.—In brief sessions of the House and Senate of New Jersey on Feb. 17, nearly 100 measures were introduced. Among those offered were two by Assemblyman Gill authorizing public ownership of electric railways and also enabling cities to operate jitney lines.

Company Will Pave Streets.—The policy of the old management of the Columbus Railway, Power & Light Company, Columbus, Ohio, has been reversed by the new officers and it will pay its part of the street paving expense, according to plans submitted recently by C. C. Slater, general manager.

Business Papers Urge Labor Conference.—At a meeting of the New York Business Publishers' Association, held on Feb. 17, a resolution was adopted urging President Wilson to call "a national conference of representatives of labor, capital and government, to the end that industrial peace, so vital to our national welfare, may be speedily restored."

Fire Detroys Interurban Carhouse.—Fire destroyed the main carhouse of the Chicago, South Bend & Northern Indiana Traction Company, South Bend, Ind., recently. Nine city cars were burned at a loss estimated at $50,000. A car stalled on the track and prevented the employees from running the others to safety. Local service in South Bend was temporarily crippled by the fire, but there was no interruption of the interurban schedule.

St. Louis Sets a Good Example.—The United Railways, St. Louis, Mo., has already reinstated about 130 men returned from service and is giving them seniority pay just as if they had not been away. The company carries a cardboard placard in the front of every car urging that jobs be found for soldiers and telling of the action it is taking. It is believed that this will result beneficially with the general public for men returning from service.

Would Negative Power of Commission.—A bill has been introduced into the Legislature of Illinois by Representative Lyon, to prohibit the Public Utilities Commission from revising or altering in any manner a contract between a municipality and a public utility corporation. The measure has been referred to the committee on public utilities. The effect of the bill, if passed, would be to restore home rule to Illinois cities in connection with the regulation of their utilities.

Mayor Favors City Bus Lines.—In a report recently filed by Mayor Fassett of Spokane, Wash., touching on the railway problem in Spokane, the Mayor suggests that the city enter the transportation business by buying 150 motor buses at a cost of $900,000. Other necessary equipment would bring the total investment to $1,500,000. This action is along lines indicated in the report of the commissioner of public utilities referred to on page 377 of this issue.

Wage Arbitration in Des Moines.—Employees of the Des Moines (Ia.) City Railway, who are asking the company for a material wage increase, have announced that after referring the question to the international organization they will seek arbitration. At a conference with the men Emil G. Schmidt, president of the company, advised representatives of the union that any further increase at this time was out of the question. The present agreement between the company and the men expires in March.

Jury Assails Public Service Law.—A declaration that the public service commission law of New York is inadequate was made by the November Grand Jury of Kings County. The declaration was made in a presentment handed up to County Judge Dike in Brooklyn a few days ago after an investigation of the railway situation in Brooklyn, undertaken as a result of the Malbone Street tunnel wreck last fall. The Grand Jury says a law is needed at once in order to obtain a public body which can, when it desires, compel service by public service corporations summarily and expeditiously, and enforce prompt compliance with its orders.

Seattle M. O. Contracts Signed.—Further steps toward the completion of the city of Seattle's purchase of the Puget Sound Traction, Light & Power Company's railway system for $15,000,000, were taken recently when the contract of delivery was signed by Mayor Ole Hanson and A. W. Leonard, president of the Traction Company. As soon as the State Supreme Court hands down a favorable decision on the legality of the purchase of utility bonds, the company is prepared to deliver to the city all properties and equipment designated in the purchase ordinance. The case has recently been argued.

Objections to Refunding Commission Expense.—The Citizens' Union of New York has started a taxpayers' suit in Brooklyn to enjoin the Board of Estimate from issuing long-term securities for $4,500,000, to cover current expenses of the Public Service Commission. The charge is made that the issuance of the securities, as proposed, would be illegal and a waste of the city's property. Justice Lazansky granted a temporary stay. The suit is based on the recent action of the Board of Estimate in authorizing the issue of corporate stock. The proceeds are to be used to "refund" the expenses of the Public Service Commission, over several years, for supervising the building of new subways. These expenses have actually been met out of tax levies. It has been freely charged that the sole purpose of the proposed "refunding" is to keep the tax rate lower than it rightfully should be.

Putting on the Finishing Touches.—New and probably final schedules showing when practically the entire dual system of rapid transit in New York City will be completed and in operation, have just been prepared by the Public Service Commission for the First District. The setting of approximately precise dates for the completion of the work was impossible until after the Board of Estimate had made the necessary appropriations. The commission believes that in the future no further attempt will be made to hold back money urgently needed for getting the other lines and branches in running condition. On the whole the returns indicate a very early date for the completion of most of the lines. Separately the dates mean little except to the New Yorker called upon to use the transportation facilities. The information about the dates is of general interest, however, as indicating the early completion of a $300,000,000 undertaking.

Program of Meeting

National Lumber Convention

The National Lumber Manufacturers' Association headquarters officials are drawing up plans for the annual lumber congress to be held in Chicago, Ill., on April 14, 15 and 16. An elaborate program of speakers covering all angles of the industry has been announced. W. S. Culbertson of the tariff commission, a recognized authority on foreign tariffs, is expected to bring out facts highly interesting to those in attendance at the convention.

Financial and Corporate

Winnipeg Net Drops

Costs High in 1918—Non-Resident Directors Retire from Management of the Company

The gross income of the Winnipeg (Man.) Electric Railway for the calendar year 1918 showed an increase of $249,713 over that of the previous year, but increased wages and operating expenses swelled the operating charges so that the net income decreased $63,845. The income statement for 1918, as presented at the recent annual meeting on Feb. 12, is shown herewith.

INCOME STATEMENT OF WINNIPEG ELECTRIC RAILWAY FOR CALENDAR YEAR 1918

Gross earnings from operations		$3,588,723
Operating expenses — before charging depreciation		2,412,226
Net operating revenue		$1,176,497
Miscellaneous income		44,931
Income available for fixed charges		$1,221,428
Deductions:		
Interest	$668,342	
Debt discount	16,255	
City percentage and car license	114,509	
Taxes	114,928	
Miscellaneous expenses	2,191	
Other deductions..	15,419	931,644
Net income, excluding depreciation		$269,784

Sir William Mackenzie, who had been president of the company since its inception, announced at the annual meeting that he intended to retire from the board, and that the other non-resident directors, Sir Donald Mann, D. B Hanna and R. J. Mackenzie, were also retiring. The following directors were elected: Sir Augustus Nanton, A. W. McLimont, F. Morton Morse, George V. Hastings, J. D. McArthur, Hugh Sutherland, George W. Allan, W. R. Bawlf and W. J. Bulman. This places the direction of the company entirely in the hands of local men. At a subsequent meeting of the new board of directors Sir Augustus Nanton was elected president and A. W. McLimont, vice-president.

During 1918 the Winnipeg Electric Railway encountered great difficulties. The prevalence of the influenza epidemic was responsible for a large loss in revenue, and in May the company's motormen and conductors went out on a sympathetic strike with the city fire brigade, tying the service up for several days. Increased wages later awarded and increased cost of materials made a large addition to operating costs.

On the other hand, the jitney competition has been eliminated. Moreover, the Public Utilities Commission upon the application of the company made an order providing for a temporary increase of fares effective on Nov. 1, 1918. Application for a permanent increase of fares is now before the commission.

Unless further unforeseen adverse conditions have to be contended with, the outlook for 1919 is said to be much brighter and more hopeful than for a number of years past. With the return of peace business is gradually resuming its normal activity, and provision is being made by the management to take advantage of the increased business which is looked forward to.

Jersey Net Still Going Down

There was a reduction of 3,091,349, or an average of 99,721 a day, in the first-fare passengers (those paying 7 cents) carried on the Public Service Railway, Newark, N. J., last December as compared with December, 1917. A report filed with the State Board of Public Utility Commissioners also shows that the company's loss for the month was $106,911, as compared with a loss of $16,939 in a like period in the year 1917.

The reduction in first-fare passengers was less in December, 1918, than in either of the two preceding months of increased fare operation. In October, 1918, compared with the same month in 1917, the falling off totaled 5,173,902, or a daily average of 166,900. In November, 1918, compared with November, 1917, there was a total decrease of 4,563,796, making a daily average of 152,126. At 5 cents in December, 1917, the company carried 29,918,220 passengers, while last December, under the raised fare, the initial, or 7-cent, riders totaled 26,826,871.

CARRIED 33,121,601 IN DECEMBER

The company carried 33,121,601 passengers in December, 1918. Of this number, 26,953,375 are designated in the report as revenue passengers and 6,168,226 as transfer passengers. The total passenger revenue of $1,937,920 was made up of $1,877,881 from 7-cent fares and $60,039 from revenue transfers.

The gross income for last December was $333,122, while for December, 1917, it was $395,258. The total revenue from transportation for December, 1918, was $1,942,622, while for the preceding December it was $1,500,407. The total operating income for December, 1918, was $265,869, against a total operating income in the month of December, 1917, of $355,381.

The cost of operation of cars for December, 1918, was $724,615, while in December, 1917, it was $580,715, the difference being mainly due to wages of trainmen, which increased from $311,700 to $446,690. The total operating expenses increased from $945,322 in December, 1917, to $1,606,148 in December, 1918. Total operating revenue deductions increased from $1,192,276 to $1,735,885.

Drastic Reorganization

Preferred and Common Stocks of Interurban Line Wiped Out—Old Bondholders Called Upon for Cash

A plan of reorganization has been announced for the Buffalo, Lockport & Rochester Railway, Rochester, N. Y., which defaulted in the payment of interest on its first mortgage bonds on Aug. 1, 1916. Reviewing earnings for six years, the committee which represents the bondholders says that, in view of needed improvements and difficulty of floating securities at present, the new company would not be justified in issuing any bonds. Both preferred and common stocks of the old company are excluded from participation in the plan. The securities to be provided for are: $2,799,000 of first mortgage 5 per cent bonds; $200,000 of second mortgage 6 per cent bonds, floated to pay interest for a period on the first mortgage bonds.

The new company will have the following capital liabilities:

	Authorized	To be Issued
Six per cent cumulative preferred stock.	$1,500,000	$1,499,500
Common stock......	2,200,000	2,199,250

The preferred stock will be distributed in the ratio of 50 per cent of holdings of either first or second mortgage bonds. Holders of first mortgage bonds will receive 75 per cent of common, and holders of second mortgage bonds 50 per cent of common. The right of second mortgage bondholders to participate in the plan is made contingent on execution of an agreement whereby they individually undertake, in ratio to their holdings, to provide any cash needed to pay dissenting holders of first mortgage bonds whatever pro rata sums would be payable under the foreclosure sale.

It is provided that the committee may take any sum of cash in the company's treasury to meet its expenses and compensation.

Depositing bondholders under a formal deposit agreement had until Feb. 10 to withdraw their securities. Non-depositing bondholders who wished to participate in the plan had until Feb. 20 to deposit.

The Buffalo, Lockport & Rochester Railway was incorporated under New York laws in June, 1905. It is a consolidation of the Albion Electric Railway, the Albion & Lockport Railway and the Albion & Rochester Railway. The road from Rochester to Lockport, 54 miles, was completed in 1908. Entrance into Buffalo is secured over the lines of the International Railway. There were outstanding $2,790,000 of first mortgage 5 per cent bonds and $200,000 of second mortgage 6 per cent bonds. In addition there were outstanding $1,500,000 of 6 per cent noncumulative preferred stock and $2,500,000 of common stock. Neither of these issues of stocks appears ever to have paid a dividend. The total of stocks and bonds outstanding per mile of line averaged $120,520.

Dallas Falls Short

Fails by $234,480 to Secure 7 Per Cent Return Allowed by New Franchise—Actual Return Only 3.97 Per Cent

The Dallas (Tex.) Railway, the consolidated street car lines under the Strickland-Hobson service-at-cost franchise, fell $234,480 short of its permissible earnings during the first twelve months of operation. The loss can be attributed altogether to the operation of the jitneys in Dallas in competition with the street cars, as the months during which the jitneys were not in operation showed an average gain for the traction company, but when the jitneys were operating in full a heavy loss was suffered.

The net earnings for the first twelve months, which ended Sept. 30, 1918, amounted to $307,637, a decrease of $7,485 as compared with the earnings of the previous year. The 1918 result made a net return of 3.97 per cent on the agreed valuation of the property, although the company, under its franchise, was to be permitted to earn 7 per cent. The difference between the allowable earnings under the franchise and the actual earnings amounted to $234,480.

The comparative income statement of the lines for the years ended Sept. 30, 1917 and 1918, is shown herewith.

COMPARATIVE INCOME STATEMENT OF DALLAS RAILWAY FOR YEARS ENDED SEPT. 30, 1917 AND 1918

	1918	1917	Change
Railway gross earnings	$1,627,419	$1,334,828	+ $292,591
Operating expenses, plus appropriations to repair, maintenance and depreciation, reserve and accident reserve	1,367,568	1,072,319	+ 295,249
Railway net earnings	$259,851	$262,509	— $2,658
Interurban terminal net earnings	46,147	42,727	+ 3,419
Non-operating income	1,639	9,886	— 8,247
Net earnings	$307,637	$315,122	— $7,485

The appropriations to the repair, maintenance and depreciation reserve totaled $176,840 or 10.86 per cent of the railway gross earnings. The franchise contemplates that the earnings should be sufficient to permit the transfer of 18 per cent of the railway gross earnings to the reserve account. The actual maintenance expenditures were $186,269, or $9,428 in excess of the amount accrued in the repair, maintenance and depreciation reserve, and it was necessary to provide for this excess through the operating expense account.

As one of the conditions precedent to the lowering of fares, the franchise provides that the balance accumulated in the repair, maintenance and depreciation reserve shall equal 6 per cent of the contemporaneous property value (which on the property value at present would amount to approximately $480,000). Under present conditions, however, no balance is accumulated in this reserve account, as the accruals are not sufficient to meet the ordinary maintenance charges.

The appropriations to the accident reserve for the year (6 per cent of the railway gross earnings, as provided in the franchise) amounted to $97,645, and the expenditures therefrom were $67,360, leaving a balance in this reserve of $30,284 as to Sept. 30, 1918.

For the twelve months ended Sept. 30, 1918, railway gross earnings showed an increase of $292,591 or 21.92 per cent over the preceding twelve months. Against this increase in gross earnings, there was an increase of 10.78 per cent in car mileage, so that the increase in earnings per car-mile was only 10.07 per cent, from 21.86 cents to 24.06 cents per car-mile. Operating expenses, plus appropriations to repair, maintenance and depreciation reserve and accident reserve increased $295,249 or 27.53 per cent. This increase was due in part to the increase of approximately 11 per cent in car mileage, but more largely to several increases in wages granted to conductors, motormen and other employees during the year as well as the increased cost of power.

The net earnings from railway operations proper decreased $2,658 (less than 1 per cent); interurban terminal net earnings increased $3,419 (8.01 per cent), and non-operating income decreased $8,247 (83.42 per cent). The total net earnings decreased $7,485 (2.37 per cent).

The net earnings of $307,637 for the last twelve months were insufficient by $21,544 to meet the amount required for the payment of the fixed charges of the company (interest on notes and bonds and rental paid Northern Texas Traction Company for the use of the Oak Cliff leased lines).

The following statement shows the earnings and expenses by quarters. The competition from jitneys was eliminated on July 1, 1918, and the figures for the last quarter show the results for a period practically free from such competition.

EARNINGS OF DALLAS RAILWAY BY QUARTERS

Quarter Ended—	Railway Gross Earnings	Operating Expenses and Appropriations	Railway Net Earnings
Dec. 31, 1917	$375,956	$303,493	$72,462
Mar. 31, 1918	370,718	325,579	45,138
June 30, 1918	389,399	338,404	50,995
Sept. 30, 1918	491,545	400,090	91,254

For the first three months following the elimination of the jitneys, the total net earnings available for the payment of the authorized return were at the rate of 5.22 per cent per annum on the property value, being still somewhat short of the 7 per cent allowable return.

Turn Thrift to Account

Plans Advocated for Wide Distribution of Public Utility and Other Investment Securities

Those in control of the management and operation of public utility companies will be interested in an article which appears in *The Annalist*, New York, for Jan. 20, entitled "Public Utility Control Through Thrift Dollars." The writer points out some new field that might be open to investment savers when Liberty Loan issues shall have ceased through the offering of stocks and bonds in denominations to meet the purse of the small buyer. He reviews the theory and practice of corporation stock and bond issues, tells how the Harris Trust & Savings Bank, Chicago, established a savings system which, for want of a better name, is called the "pass-book system," whereby a bond could be paid for in installments, and refers to some of the successful flotations of public utility issues by such companies direct to their patrons.

O. B. Willcox, of Bonbright & Company, New York, who has given a great deal of study to public utility securities, is quoted as strongly advocating the production of fractional units in corporation securities both to supply the demand created by war loans and to aid utility companies in obtaining a just measure of political recognition through the wide dissemination of the companies' capital. While admitting the mechanical difficulties of distribution and the relatively small profit existing on the individual transaction and the impossibility of using high-priced salesmen in connection with this type of business, Mr. Willcox is of the opinion that a continued campaign of education will bring these buyers voluntarily to the doors of the dealer.

Discussing means for enlarging the field of investment opportunity, in order to encourage the growth of the spirit of saving born of the exigencies of the war, Travis H. Whitney, chairman of the Public Service Commission for the First District of New York, and Commissioner F. J. H. Kracke, in *The Annalist* of Jan. 27, considered with favor the suggestion that municipal and public utilities securities be issued in such denominations, or in such manner, as to suit the purses of the army of small investors that is learning the new lesson of thrift.

In the issue of the same paper for Feb. 3, Theodore P. Shonts, president of the Interborough Rapid Transit Company, New York, entered the discussion. He is fully in accord with the views of Messrs. Whitney and Kracke as to the importance of a channel for thrift investment. He declares, however, that the most important channel in New York—public utilities—is practically closed by the attitude of the local authorities, and until, as he contends, the safety of the investment is assured, no lesser problem is of importance.

Philadelphia Rapid Transit Must Pay

The Philadelphia (Pa.) Rapid Transit Company must pay the income and excess war-profit taxes levied by the government on ten of its underlying companies. A decision to this effect was rendered on Feb. 17 by Chief Justice Brown in the State Supreme Court. The ruling affirms the decision of the Common Pleas Court. The amount involved is upward of $360,000.

When the controversy arose thirteen suits were started against the Philadelphia Rapid Transit Company by the subsidiary companies to recover the tax. The legal fight centered around the clauses in the leases under which the transit company took over the roads. It was contended these covenants expressly stated the transit company must pay all taxes being levied, or hereafter to be levied.

Ellis Ames Ballard, chief counsel for the transit company, and ex-Judge Beitler, argued that when the leases were made it was never contemplated extraordinary obligations, as war taxes, would crop up. The court, however, construed leases in ten cases as binding upon the transit company to pay the taxes. In three other companies the leases were different and the court found in favor of the transit company. About $11,000 was involved in these cases. Justice Brown in his opinion says in part:

> In the case at bar, the income tax is laid upon net income and the so-called war excess-profit tax is laid upon income received during the calendar year, preceding the time when the tax is assessed. So far as the covenant under consideration is concerned, we think it amply sufficient to cover both the income tax and the excess-profit tax in view of the fact that any taxes assessed upon the earnings or profits of the plaintiff were to be paid by the defendant. The plaintiffs having turned over all of their property to the defendant, the only earnings or profit they can receive are from the lessee, and whether the tax be imposed upon income, net or gross, it is in fact imposed upon the rental. Earnings and profits under the circumstances must be regarded as was the yearly rent in the North Penn case.

Receiver Reports on Montgomery Property

Ray Rushton, as receiver for the Montgomery Light & Traction Company, Montgomery, Ala., has filed in the United States District Court in Montgomery a statement of the indebtedness of the company showing obligations amounting to $1,794,158. Of this amount $1,430,000 is represented by bonds and $171,000 by notes secured by mortgages, and $193,158 is owed on open accounts.

In his report Mr. Rushton states that the property of the company, particularly the railway, is in need of repairs and betterments, which are absolutely necessary to enable the property to be operated with anything like reasonable efficiency, and that a supply of materials necessary to put the cars in operating condition will be needed, costing altogether approximately $10,000.

In addition to these items money is needed to pay licenses and taxes so as to protect the property. In order to meet these demands he petitions the court for authority to borrow money from time to time as it may be needed, issuing notes or certificates as a lien on the net income of the properties of the company and upon the properties themselves.

Unsecured accounts owed by the company are given as follows: State and county taxes $12,584; taxes and license for 1916, 1917 and 1918 paid by the Commercial Trust & Savings Bank, New Orleans, $44,800; Montgomery city taxes and license for 1918 $6,000; unsecured notes $83,000; open accounts $32,300; personal injury and property damage suit judgments, $14,474.

A Plea for One Committee

A committee of which Thomas E. Gates is chairman and J. C. Wallace secretary, has addressed all holders of bonds issued by corporations included in the Pittburgh (Pa.) Railways System, urging that the holders of all bonds in the system have a common interest to protect and stating that this can be most effectively done by one protective committee representing all bondholders. The committee says in part:

> The undersigned committee was formed in January, 1918, for the protection of holders of bonds of the various corporations included in the Pittsburgh Railways System, almost immediately after defaults had been permitted to occur in the payment of interest due on Jan. 1, 1918, on fifteen of these issues.
>
> At that time deposits were invited only of bonds of such issues as had been defaulted on Jan. 1, 1918, and several million dollars of these bonds were deposited with the committee.
>
> On Feb. 14, 1918, a test suit in equity was instituted by one of the committee's depositing United Traction Company bondholders, to compel the Philadelphia Company to recognize liability for the principal and interest of all bonds issued by subsidiaries in the street railways system.
>
> After the filing of this suit, the interest on practically all bonds which had been defaulted on Jan. 1, 1918, was paid, but on April 23, 1918, receivers were appointed for the Pittsburgh Railways and thereafter additional defaults were permitted to occur, until at the present time approximately twenty-nine bond issues are in default as respects one or more interest payments.
>
> Under these circumstances, the undersigned believe that the holders of all bonds in the system have common interests to protect, and that this can be most effectively done by one protective committee representing all bondholders.
>
> They believe that if the Pittsburgh Railways System is permitted to be reorganized without proper consideration being given to the liability of the Philadelphia Company for the payment of its debts, or if divergent action by the owners of the underlying securities should result in a disintegration of the system, there is grave danger that the holders of bonds on the underlying systems will not only be kept out of their interest from time to time for shorter or longer periods, but that a large portion of the volume of their principal invested in these bonds may be jeopardized.
>
> They accordingly call on all bondholders, whether defaults in their bonds have actually occurred or not, to deposit all bonds with one or the other of their depositories.
>
> An amendment of the deposit agreement has been drawn providing that deposited bonds upon which interest shall have been paid when due may be withdrawn prior to the occurrence of default without expense to the depositor.
>
> The deposit agreement already contains provision for protecting the interests of any class of bondholders whose interest may at any time become adverse to the interest of any other class.

Financial News Notes

Note Issue Authorized.—The Chicago (Ill.) City Railway has been authorized by the Illinois Public Utility Commission to issue $1,700,000 of promissory notes.

Stock Issue Authorized.—The Jacksonville Railway & Light Company, Jacksonville, Ill., has been authorized to issue $123,000 of additional preferred capital stock.

Small Block of Bonds to Be Sold.—The Ohio Public Utilities Commission has authorized the Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio, to sell an issue of $32,000 of bonds at 85 per cent of par or to pledge them for a loan at 65 per cent. The proceeds are to be used in making improvements.

St. Louis Directors Re-elected.—At the annual meeting of the stockholders of the United Railways, St. Louis, Mo., on Feb. 11 the former directors were re-elected. The directors later organized by re-electing all the former officers and creating a new office, that of second vice-president, to which post Murray Carleton, formerly vice-president, was elected.

Want Service Restored.—Citizens of Conway and Ashfield were heard recently by the Massachusetts Public Service Commission on their petition for restoration of service on the Conway Electric Street Railway, controlled by the Boston & Maine Railroad. The commission reserved decision. The company has offered to sell the property to the towns concerned for its value as junk.

Receiver Wants to Discontinue Lines.—James H. Hustis, who is receiver of the Boston & Maine Railroad, has filed with the Public Service Commission a petition for authority to discontinue permanently the so-called North Hampton branch and to discontinue temporarily the so-called North Beach branch of the Portsmouth Electric Railway. The commission set Feb. 17 as the date for a hearing.

Yonkers Abandonment Hearings Continue.—Chairman Hill and Commissioner Fennell of the Public Service Commission for the Second District, at Yonkers on Feb. 14 gave hearings upon the proceedings to abandon part of the line of the Yonkers Railroad, the New York, Westchester & Connecticut Traction Company, and the Westchester Electric Railroad, and upon the complaint over service by the railroad between Tuckahoe and New Rochelle. The case has not yet been closed.

Successor to St. Joseph Valley Organizing.—The Indiana Public Service Commission has authorized the La

Grange, Toledo & Eastern Railway to issue $55,000 of common stock at par and $35,000 of bonds at par to finance the rehabilitation of that part of the defunct St. Joseph Valley Railway between La Grange and Mongo. This part of the old road connects at La Grange with a division of the Pennsylvania lines and will afford an outlet to the business which otherwise would have been shut off from railroad communication if the old St. Joseph Valley Railway had been junked.

Offer Montreal Tramway Bonds.—The Montreal Tramways & Power Company, Ltd., Montreal, Que., has sold an issue of $7,300,000 five-year 6½ per cent gold bonds, due 1924, which are being offered by the Crédit Canadien in Montreal at par and interest. Subscriptions to the issue are being asked in New York by A. Hicks Lawrence, at the same price, and the firm is inviting a limited exchange of the Montreal Tramways & Power Company 6 per cent notes, due April 1, to net holders a premium of approximately 1¾ per cent.

$1,428,062 Award to B. R. T.—Judge Mayer has made an order authorizing Lindley M. Garrison, receiver of the Brooklyn (N. Y.) Rapid Transit Company, to accept the award of the board of appraisers of the War Department, on Jan. 20 last, of $1,428,062, for certain dock property in the vicinity of Sixty-third, Sixty-fourth and Sixty-fifth Streets, South Brooklyn, owned by the New York Consolidated Railroad. Out of this money, $659,000 is to be applied to the payment of principal and interest of bonds of the Sea Beach Railway, dated Sept. 1, 1896, all of which are owned by the Brooklyn Rapid Transit Company.

Receiver Dispelling the Gloom.—The Chicago, Aurora & DeKalb Railroad, Aurora, Ill., reports an exceptionally satisfactory business for the month of January. Out of one station, Kaneville, the company transported 100 cars of livestock and grain. The net earnings of the road during the year 1918 under the management of Receiver Gunsul showed a net increase of 38 per cent. Passenger traffic has also been increasing. The company is hauling daily each way carload and less than carload freight, and during the month of January two express cars were operated. Special passenger cars are also operated occasionally.

Protest Against Abandonment. — About fifty residents of Melville, Long Island, have filed with the Public Service Commission for the Second District, a protest against threatened discontinuance of electric railway service by the Huntington Railroad. The trolley lines make connection with the main lines of the Long Island Railroad, and the complainants protest against the proposed discontinuance on the ground that it would entail direct and substantial loss to property and compel residents to move elsewhere and would make it impossible for them to travel to their places of business.

Refuses Transfer of Receivership Case.—In the receivership case brought against the Columbus Railway, Power & Light Company, Columbus, Ohio, Attorney F. S. Monnett has filed with the Franklin County Clerk of Courts depositions tending to show that the Tennessee Power Company, controlled by the E. W. Clark interests, which also formerly operated the Columbus property, made a large profit on the transfer of a turbo-generator to the Columbus company. An attempt was made to have the receivership case transferred from the Common Pleas Court to the United States District Court, but Judge Kinkead instructed the Clerk of Courts to refuse to deliver the records to any one, no matter what the pretext.

Receiver Asks Directions.—The petition of Receiver Frank H. Swan of the Rhode Island Company, Providence, R. I., for authority to pay back-wages amounting to $72,000 to the employees of the company, has not yet been heard by the Superior Court, but it is probable that it will come up within a few days. After the court passes on the petition Mr. Swan will probably find it necessary to petition the court again shortly, as a payment of $180,000, representing rental of leased lines due the United Traction & Electric Company, becomes due on Feb. 24. At present there is a balance of $47,500 due the latter company on account of rentals due on Dec. 24, last, a compromise having been effected whereby the Rhode Island Company made its payments in installments.

Cities Must Buy or Road Will Suspend.—That the towns through which the Norton & Taunton Street Railway, Norton, Mass., operating 21 miles of line between Norton, Attleboro, Mansfield and Taunton, passes must purchase the road or it will be junked, was the statement made recently in Attleboro. The fare was increased to 6 cents in 1917 and to 7 cents in 1918, but the revenue does not show the gain needed to make a return on the investment. Attleboro, which already owns and operates a 3-mile railway to Briggs' Corner, will be asked to buy the Norton, Taunton and Attleboro line to Chartley. Norton has a line from Chartley to the Taunton line and from Norton Center to Mansfield, which it will be asked to buy. Five miles of the railway are within the limits of Taunton and the rest is in Mansfield territory.

Spokane Merger Again Considered.—According to D. L. Huntington, president of the Washington Water Power Company, Spokane, Wash., there is a distinct probability of an early combination of the systems of the Washington Water Power Company and the Spokane Traction Company. The plan which has received most favorable consideration, according to Mr. Huntington, is for both companies to deed their property to a third company, taking in exchange stock in the new corporation. F. S. Conners, receiver of the Spokane & Inland Empire System, which includes the traction company, says the plan of consolidation will likely go through if the Legislature, now in session, passes a law allowing electric railways to charge more than 5 cents for fare. The merger has been under consideration for three years. Last May it was reported to be nearer a successful conclusion than at any previous time.

Indianapolis & Cincinnati Adversely Affected.—The financial statement of the Indianapolis & Cincinnati Traction Company, Indianapolis, Ind., for the year ended Dec. 31, 1918, shows a gross income of $532,143, operating expenses of $389,517, net operating earnings of $142,625 and net income of $136,673. Interest of $60,000 on outstanding bonds due Jan. 1, 1919, was not paid, certificates of indebtedness due two years thereafter and bearing 6 per cent interest being issued in lieu of same. Dividends of $15,000 due Oct. 1, 1918, were not paid, certificates of indebtedness due two years after the close of the war being issued. Claude Cambern, secretary, says that the company was adversely affected by war conditions and that the expected decrease in costs of labor and materials since the signing of the armistice has not materialized. The prospect for the extension to Cincinnati, upon which the final success of the property depends, is said to be uncertain and indefinite until the cost of construction reaches a more nearly normal level.

Abandonment Authorized.—The Los Angeles & San Diego Beach Railway has been authorized by the California Railroad Commission to discontinue its railway service, public hearings held in the matter having shown that for more than five years past the receipts from operation have been insufficient to pay operating expenses or interest. The hearings developed that the smallest deficit sustained in any of the five years covered by the hearings was $9,605, and that an approximate deficit for the entire five-year period was $69,112. Abandonment of the service was opposed by the Chamber of Commerce of La Jolla, the Chamber of Commerce of San Diego, the city of San Diego, the Citizens' Club of Pacific Beach and the San Diego Beach Company, none of which, however, was able to advance an alternative proposition. In rendering its decision, the commission held that that part of the petition referring to dismantling the road and the restoration of streets upon which the company's rails have been laid, is not within the jurisdiction of the commission. Of the 20,000 shares of stock, the company was authorized to issue 5460 at $100 a share, which have been fully paid up, and 10 per cent has been paid on 1650 shares of common stock, there being no preferred stock issued. There is outstanding a bond issue of $375,000, maturing on Jan. 2, 1950. The company owes E. S. Babcock $109,209 and has outstanding notes totaling $83,261.

Traffic and Transportation

Voluntary Tax Succeeding

Convinced of Justice of Fare Appeal 1500 Patrons Agree to Pay Seven Cents

The movement for the payment of a 7-cent fare by the patrons of the New York & North Shore Traction Company, Roslyn, Long Island, is progressing satisfactorily. According to estimates made a few days ago more than 1500 persons have voluntarily agreed to pay the extra 2 cents.

MOVEMENT A VOLUNTARY ONE

The League of Voluntary Seven-Cent Fare Payers, which is behind the movement, is continuing its campaign actively in behalf of the company through posters in the cars, direct personal appeals and through public meetings. That the residents of the district through which the company operates are whole heartedly behind the movement is shown by the diversity of the interests included among the officers and directors of the league. The chairman, Elmer G. Story, is president of the Bay Side National Bank; the vice-chairman, Mrs. J. K. Robinson, is head of the Women's Welfare League of the L. W. F. aeroplane factory in College Point; the secretary, Mrs. Elizabeth Gross, is society editor of the Flushing *Journal*. Among the other directors are the assistant district attorney of Queens County, a prominent real estate man, the chairman of the transit committee of the United Flushing Association, a retired bank president, a New York attorney who is attorney for the Douglaston Civic Association, and a Flushing business man who represents the Flushing Business Men's Association.

Since the active campaign was started in its behalf the railway has submitted to the Board of Estimate & Apportionment of New York another petition in which it suggests a new fare plan to the city.

CASE ESTABLISHED BEFORE COMMISSION

The first appeal by the railway to the city was dated June 22, 1918. Its request then was for a 7-cent fare on its lines within the limits of New York City. The proposition now made is for the sale of the lines to the city or for their lease to the city under an agreement which in short would guarantee a return of 6 per cent on the fair value of the investment. The Board of Estimate has referred this petition to its franchise committee.

In presenting this offer the company points out that the facts justifying the charge of a 7-cent fare have been fully established before the Public Service Commission after a critical and exhaustive examination.

So far so good. At this point enters discord. He makes his appearance in the shape of Corporation Counsel William P. Burr. Mr. Burr is not satisfied that everything is as it should be. At least the papers make him appear in this light. "After a cursory investigation," Mr. Burr is "firmly convinced the company is illegally collecting 2 cents from those who pay 7 cents." He evidently intends to protect the people against themselves, for, says he, "if I find that the company has used coercion I shall take the necessary steps to meet the situation."

Hearing on Overcrowding Shows Need for More Equipment

The purchase of a large amount of new equipment for the Boston Elevated Railway was forecasted by Samuel L. Powers, one of the five trustees, at a hearing before the electric railway committee of the Legislature on Jan. 30. The discussion centered in a bill which aims to prevent overcrowding of cars by limiting straphangers to "five passengers above the actual seating capacity of each car."

Advocates of the increase contended that overcrowded cars were responsible for the spread of contagious diseases, and that such congestion could be obviated by running more cars.

Dr. W. C. Woodward, head of the Boston Department of Health, stated that the 300 employees of the department have been reporting to the office on the sanitary condition of cars, numbers of passengers standing and numbers of vacant seats. Reports of several months ago showed unsatisfactory conditions, but current reports indicate marked improvement.

H. W. Barnum, general counsel for the trustees, said the net result of the bill would be to penalize the corporation. If the public requires improved facilities, such as new cars, the State must authorize the expenditure of more capital.

Mr. Powers stated that the road expected to receive, early in April, the first instalment of 250 new cars ordered last July, and all by midsummer. He hoped for the assumption by the State of the burden of carrying the cost of the Cambridge Subway, by which about $9,000,000 would be released for use in rehabilitating equipment. In referring to the subject of care of cars and ventilation, Mr. Powers said that while cars are washed thoroughly every two weeks, it is proposed to make a daily cleansing as soon as possible, and that it is likely that all cars will eventually be equipped with blowers of the type installed on the Chicago traction system.

A Helpful Suggestion

Illinois Commission Points Out Wherein the Utilities Can Work to Better Their Public Relations

As a result of the experience of the Public Service Commission of Illinois extending over a period of five years in meeting various problems involving the relations of public utilities with the public, the commission has become very strongly impressed with the large influence which the quality of service rendered and the methods of handling complaints exert upon the character of this relationship with the public. In consequence the commission wrote a letter on Feb. 1 to all the utilities of the State except the steam railroads which reads in part as follows:

> During the recent times of stress, with the attendant scarcity of labor, there has been a tendency on the part of utilities to decrease the standard of service rendered, possibly with a view to more economical operation and possibly because of inability adequately to supervise the work of strange employees necessarily employed. In so far as such a policy may have been intended, we believe that it is most unwise and that instead of operating to relieve the utility of its burdens, it will greatly increase them. We have seen this proved repeatedly during the past year.
>
> A POINT OF CONTACT OFTEN NEGLECTED
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> Through the handling of complaints most utilities find their only opportunity of meeting their consumers. This is unfortunate, because the utility gains its impression of its consumers through these complaints, which are often presented at times when the consumer is aggravated, and, on the other hand, the consumer gains his impression of the utility through the methods by which the complaint is handled.
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> With the utility, the handling of complaints is a routine transaction which occurs with regularity, and the employees engaged upon this phase of the work come to regard the complaints merely as a part of the company's routine which is capable of being handled by routine methods, in much the same manner that material is passed through the stock room. With the consumer, however, a complaint is not a routine matter, but represents to him a real grievance. In other words, utilities are apt to regard a complaint as lacking individuality, while from the consumer's standpoint, each complaint has a very distinct individuality and stands out in his mind as a particular situation which merits individual attention.
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> We have been frequently impressed with the fact that if a utility is willing to accord to each complaint an individuality and give it a just investigation, both from the consumer's and the utility's viewpoint, the complaint is well satisfied and, as a result of his contact with the company, has an appreciation of its human characteristics and a regard for its sincerity of purpose. A routine reply to some classes of complaints may be suitable, but its routine nature will usually impress the complainant unfavorably.
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> A BROADMINDED POLICY ESSENTIAL
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> The problem as to the future of public utilities is one which occupies considerable attention in the public mind to-day and is one which is of vital importance to the utility and to the public. We believe that much of the criticism directed against utilities and which, in a certain measure, reacts against the regulatory bodies charged with their supervision, might be relieved by a broadminded policy of handling complaints in which each case is treated as an opportunity for acquaintanceship with the consumer and each complaint is impartially investigated.
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> I hope that you, as the responsible executive of a utility, will give the subject matter of this letter careful consideration. It is presented as a helpful suggestion regarding a vital matter and with the further idea that in many cases the operating heads of utilities inadvertently allow themselves to get out of touch with working details, some of which have a very important bearing upon the development of this complicated situation.

Rehearing Denied

Commission Will Not Reopen Case Which Resulted in Increased Fares in Indianapolis

The Public Service Commission of Indiana, on Feb. 12 issued an order denying a petition filed by Woodburn Masson for the West Side Improvement Organization and for Edward P. Barry, in which the petitioners asked that the commission grant them a rehearing in the case of the Indianapolis Traction & Terminal Company which resulted in higher fares in Indianapolis.

With the denial of the petition appeared the possibility that a complaint may be filed in one of the local county courts, which will ask that the original order of the commission be set aside, and that the railway be enjoined from collecting any other than the franchise fares.

Mr. Masson said that it "might be some time yet" before the suit is filed. He said, however, that the petition for rehearing was filed as a formality to get the case into the courts and to test the authority of the commission to change the terms of a contract entered into between the city and the railway when the city had a specific grant of power from the Legislature to make the contract according to fixed specifications.

It was explained also that the case will be carried to the Supreme Court of the United States in an effort to knock out the 5-cent fare. The petitioners assert that the 5-cent fare is unreasonable under the circumstances and is charged because of alleged mismanagement of both capital and operating affairs of the railway. The attorneys for the railway state that there could be no possibility of taking the matter into the federal courts as the situation is purely a local one, and there is no federal question involved.

Bridgeport Acts While Hartford Thinks

Bridgeport, Conn., is a buzz-saw city. Its peripheral speed is tremendous. It cuts clean and true. It is an old city with new ideas, new hopes and new aspirations. That it is in a large measure a war-boom city is nothing against it. In fact, the influx to it has taught it how to absorb, digest and get the most out of the new elements that have been injected into its life. If Bridgeport had been afraid of an idea it never could have scored the industrial triumph which has made it a source of wonder to those who are given to dealing with figures that spell finished product. That Bridgeport does not shy at a new idea is illustrated by its quick and hearty reception of the one-man car and by its bid for more of these vehicles. Thus the Bridgeport *Standard-Telegram* of Feb. 15 said:

> Hartford is grousing a bit at the prospect of getting some "Toonerville trolleys"—as they call the Birney safety car—and is wondering whether they really ought to be permitted.
>
> Bridgeport should put in a quick bid to the Connecticut Company. All the Birney cars that Hartford does not want, Bridgeport will take.
>
> These trolleys are the logical development of the traction business. They represent a sane and sensible departure from the conventional and cumbersome "jumbos."
>
> They take about one-third the power of the big car, get under way faster, are easier of control, safer of operation, cover their runs in quicker time and furnish better accommodation to the public. What more is wanted of a trolley car?
>
> The Birney cars in operation in Bridgeport are giving every satisfaction. They furnish seats for all and travel fast enough to maintain a five-minute headway, doing away with the necessity of long waits on street corners.
>
> If they can help the Connecticut Company out of its financial difficulties and afford the happy means of giving good service while affording a sufficient revenue for operation at a fair profit, the public will rise up and call them blessed.
>
> Mr. Fox's cartoons are not far out of the way. A return to the Toonerville trolley with its lone "skipper" is apparently the solution of our traction troubles.

Dallas Jitneys Ruled Out

The anti-jitney ordinance enacted by the city of Dallas, Tex., designed to stop jitney operation, has been upheld by the Court of Civil Appeals for the Fifth Supreme Judicial District of Texas, sitting at Dallas. The decision came in the refusal of the court to grant an injunction on petition of the Dallas Jitney Drivers' Association to restrain the city of Dallas from taking action to enforce the city ordinance on the ground that the ordinance was violative of the State Constitution.

The ordinance in question sought to eliminate the jitney from the business district of Dallas by prohibiting jitneys from operating within a prescribed zone. Since the passengers were gathered and discharged mainly in the business district, the measure effectively put them out of business.

In denying the injunction the court held that under its police power the city has authority to enact any ordinance designed to protect the lives of its citizens, or their property or rights, and that the ordinance prohibiting the operation of jitneys on the business streets of the city was a measure designed to protect the city by eliminating congestion.

As to the claim of the jitneys that the ordinance was discriminatory in that it favored the railway, the court denied such discrimination. It held that the railway was compelled to take measures to insure the safety of passengers and pedestrians; that the railway could be held liable for any damage done, but that jitneys could not be so held.

In Woman's Interest

A bill to protect women conductors in New York is now before the Legislature at Albany. It is backed by the Women's Joint Legislative Conference. The bill limits the hours of women workers to nine consecutive hours a day, and thus eliminates the "swing" between runs; provides that they be paid from the time they report for duty; for one day's rest in seven; eliminates work after 10 o'clock p.m.; makes suitable toilet facilities compulsory, and prohibits the employment of either male or female minors.

Battling for Its Life

Trolley and Auto Stage a Fight to a Finish in Small Connecticut Community

The Danbury & Bethel Street Railway, Danbury, Conn., now in the hands of J. Moss Ives as receiver, is battling for its life. Its antagonist is the automobile. There is no effort on the part of the railway to hide its fears. In fact, through public notices and by appeal direct to such patrons as still remain to it the company says frankly that the community will have to choose between the two forms of transportation. Already the company has been compelled to abandon the Bridgeport to Long Hill line on account of unfair jitney competition. Other branches will have to go if conditions do not improve. The appeals which are posted in the cars call attention to the fact that the company pays taxes, keeps up part of the pavements, keeps the track clear of snow and ice in the winter, runs cars on schedule time whether or not they have passengers, and pays the seventy odd employees more than $1,300 a week in wages. Each of the three appeals which have been posted asks the public to choose between the jitney and the trolley, and reminds the reader that the public cannot have both.

The same hostility to the electric railway that has manifested itself in so many other instances seems to be present here in exaggerated form. A combination of conditions that lead up to a receivership do not make for amiable public relations, and in this case the tendency persists to carry over and inflict punishment on the receiver for sins fancied and real of the managements of the past. In other quarters there is an air of total indifference. As the matter now stands things seem to be half jitney, half trolley. If the jitneys are forced to go there appears to be doubt about the trolley, despite its appeal for confidence. On the other hand if the trolley is forced to go there appears to be hope that a permanent, reliable motor bus system will then result.

B. R. T. Looking Up

Improvement in the service on the Brooklyn (N. Y.) Rapid Transit Company lines, also in the number and character of employees, is indicated in a statement issued by Lindley M. Garrison, receiver for the company. The statement is based on a comparison of reports of the various departments from November, 1918, to the end of January, 1919. The report says:

> The number of employees on rapid transit lines has increased from 3550 in November to 3859 at the end of last month. In the same time cars available for service on these lines have increased from 1221 to 1318. In January there were 474,410 trips made on subway and elevated lines, an increase of 48,769 trips over the November showing. The mileage record for January was 4,165,216, an increase of 395,255 miles over the record for November. On the surface lines the number of round trips increased by 50,000 last month over those operated in November.

Women shop employees are being replaced by men, discharged soldiers being given the preference. Thirty of the 157 women in the shops in November have resigned. The report states that the additions to the different operating forces have improved greatly the morale of all the workers. In spite of the fact that 825 men left the service of the surface transportation department either by resignation or discharge there has been a net gain of 457 employees. In the elevated and subway transportation departments there was a net gain of 114 men, although 425 men left the service.

Transportation News Notes

Six Cents for Valdosta.—The Valdosta (Ga.) Street Railway was recently authorized by the Railroad Commission of Georgia to increase fares from 5 cents to 6 cents, effective immediately.

Skip Stop Abolished.—The skip-stop system of operation on the lines of the Indianapolis Traction & Terminal Company in the city of Indianapolis was abolished on Feb. 9, following an order of the Board of Public Works.

One-Man Cars for Greenville.—E. F. Taylor, vice-president of the Southern Public Utilities Company, Charlotte, N. C., has announced that two one-man cars will be placed in operation on the lines of the company in Greenville, S. C., as an experiment.

Zone Fares Made Seven Cents.—The Public Service Commission of New Hampshire recently ordered public notice of an increase in fares from 6 cents to 7 cents per fare zone, with no changes in the fare limits filed by the Portsmouth Electric Railway, to become effective on Feb. 23.

Six-Cent Fare at Lima.—The City Council of Lima, Ohio, recently voted to grant the Ohio Electric Railway a 6-cent fare for its local service in that city, effective from Feb. 10. The city agreed several months ago to make the increase on the condition that the company would increase the wages of the men. Nine tickets will be sold for 50 cents.

Six-Cent Fare Bill in New York.—Assemblyman Louis M. Martin, chairman of the Assembly judiciary committee, has introduced a bill which makes possible a 6-cent fare on the surface, elevated and subway lines in the city of New York. The bill empowers the Public Service Commission to authorize fare increases regardless of franchise rate limitations.

New Worcester Tariff Suspended.—The Public Service Commission of Massachusetts has ordered the Worcester Consolidated Street Railway to suspend until March 9 at least, the putting into operation of the 7-cent fare in Worcester and county towns served by the company. Hearings are now in progress in regard to the need for the company to charge 7 cents.

A Six-Mile Road Wants More.—The Albany (Ga.) Transit Company, which operates 6 miles of line, has asked the Railroad Commission of Georgia for permission to increase its fares from 5 cents to 10 cents. The deficit of the company last year was $4,000. The president and the secretary of the company draw $25 each per month and the total office expense is only $137 a month. The road is owned locally.

Would Speed Up Dayton Cars.—An ordinance is before the City Commission of Dayton, Ohio, which provides for increasing the speed of electric railway cars in the business district from 10 m.p.h. to 20 m.p.h. and in the outskirts to 25 m.p.h. It also enumerates the stops to be made on the routes. Instead of a straight skip-stop plan, the ordinance seeks to stagger the stops by placing them where they will be needed most.

One-Man Cars for Brooklyn.—The Brooklyn (N. Y.) Rapid Transit Company has four one-man cars at its shops at Fifty-second Street which it is planning to put into operation as an experiment on the Nassau Avenue line in the Greenpoint section of the city. This is a short feeder line, which extends from Manhattan Avenue to Newton Creek. These four cars are the first of a shipment of twelve one-man cars which the company expects to try out on its lines.

New Mail Service for I. T. S.—Negotiations are said to be under way between the officials of the Illinois Traction System, Peoria, Ill., and the United States postal authorities with a view of making mail trains out of the two night runs between Peoria and St. Louis through Springfield. If the agreement is reached it means that the Illinois Traction System will have three-car trains, consisting of mail car. coach and sleeper, running in each direction between Peoria and St. Louis.

Reduced Fare Denied to School Children.—A petition for a fare of 2½ cents for school children in the city of Boston has been refused by the trustees of the Boston (Mass.) Elevated Railway. The trustees state the action was taken because the cost of transporting the school children of Boston would not alone be assessed upon the taxpayers of that city, but also upon the taxpayers of other cities and towns served by the elevated system, which is now operated under guarantees from the State.

Fares Increased in Temple.—The Temple (Tex.) Traction Company, the Temple-Belton Interurban Company and the Belton (Tex.) Traction Company, all owned jointly, increased fares on Feb. 1. The local fares in Belton and Temple were increased from 5 cents to 7 cents with four rides for a quarter, and the interurban fare between Temple and Belton was increased from 25 cents to 35 cents. So far there has been no complaint and no effort on the part of patrons to enjoin such increases.

Question of Fare at Massillon.—Members of the Council at Massillon, Ohio, are not all agreed as to what should be done with the request of the Northern Ohio Traction & Light Company for 7-cent fare on the city lines. Some of them are inclined to agree with the company, if it will make certain improvements suggested, while others contend that 6 cents will be sufficient to cover the increased expense of operation.

Old Fares Restored for Columbus Suburbs.—It has been announced by President Charles L. Kurtz that the 5 cents added to the fares of passengers for Linden, Camp Chase and Beckley by the old management of the Columbus Railway, Power & Light Company, Columbus, Ohio, have been eliminated, after a careful investigation of passengers from those points, made by C. C. Slater, general manager. These points will be effected by any general legislation in regard to increased rates of fare that may be enacted.

Would Compel Company to Re-establish Tickets.—Samuel L. Seeman, an insurance man of Des Moines, Ia., has applied to the Federal Court there for permission to continue his suit in the District Court to compel the Des Moines City Railway to re-establish the sale of tickets at six for a quarter. He further asks that Emil G. Schmidt and Homar A. Miller, receivers of the railway, be made parties to the suit. Mr. Seeman's attorney announces that his client will soon request as "a friend of the court" to have the receivership dissolved.

Would Discontinue Tickets.—The Black River Traction Company, Watertown, N. Y., has filed with the Public Service Commission for the Second District, a new tariff schedule proposed as effective on March 7 and affecting local passenger traffic on its lines. The proposed change is that the sale of books containing twenty-five tickets for $1, each ticket good for one local 5-cent fare, is to be discontinued. The company will redeem pro rata all outstanding tickets when presented at the company's general office in Watertown.

Survey Before Service Is Cut.—The Des Moines (Ia.) City Railway will make a survey of at least a week's duration before announcing the service cut which it will make as a result of the decision of Federal Judge Martin J. Wade denying the company's request for an increased fare. Emil G. Schmidt, president of the company, has announced that a cut of 20 per cent in service would mean a saving for the company of $175,000 a year. Attorneys for the city have announced that they will fight any attempt on the part of the city to reduce service.

Reduction in Its Commutation Fares.—Under a supplemental tariff, filed with the Public Service Commission for the Second District, the Auburn & Syracuse Electric Railroad, Auburn, N. Y., effective on March 9, will sell fifty-trip commutation ticket fares for distances, 19 to 22 miles inclusive, for $13.75. The tariff cancels higher commutation rates, $14.25 for 19 miles, $15 for 20 miles, $15.75 for 21 miles and $16.50 for 22 miles. Patrons who buy commutation fares for distances 19 miles and over, will secure reductions over existing commutation fares.

Wants Seven Cents in Port Jervis.—The Port Jervis (N. Y.) Traction Company, operating in Port Jervis and the town of Deer Park, Orange County, has filed with the Public Service Commission for the Second District, a petition asking permission to increase its rate of fare from 5 to 7 cents. The commission will conduct a public hearing. The petition shows that the Port Jervis Common Council on Dec. 19 passed a resolution permitting the company to increase its rate of fare to 7 cents until Dec. 31, 1919. Like action was taken by the Deer Park Town Board on Dec. 28.

Protest Fare Increase.—Eight city officials and residents of Maywood, Ill., protested to Federal Judge K. M. Landis against increased fares on the Aurora, Elgin & Chicago Railroad under the decision of Judge Landis himself. The railroad was ordered to restore the 5-cent fare within the limits of Maywood. The rates had been raised to 10 cents. The residents also protested against the new 10-cent rate from Maywood to Forest Park and against increases in the price of fifty-four-ride tickets from Chicago from $5.60 to $6.40 and the sixty-ride tickets from $5.95 to $6.70.

New Boston & Worcester Fares Approved.—The Public Service Commission of Massachusetts has approved a new fare schedule for the Boston & Worcester Street Railway, which will become operative on March 9. The fare rate is increased from 2½ cents to 3 cents a mile, and the minimum fare is increased from 6 cents to 7 cents. At the request of the commission, however, the reduced rate ticket privilege now given to residents of Overbrook will be extended by the company to residents of Sunnyside riding through the Overbrook territory, thus giving them a lower fare on through trips to and from Boston.

Another Company Wants Seven Cents.—The Freeport Railway & Light Company, Freeport, Ill., a subsidiary of the Illinois Northern Utilities Company, has applied to the Public Utilities Commission of Illinois for an increase of fares in Freeport from 5 cents to 7 cents, for trips within the city limits or 600 ft. beyond, with eight tickets to be sold for 50 cents. Rates would increase, under the petition, from 5 cents to 10 cents for trips to or from any point more than 600 ft. from the city limits to a point on the city lines, with a round-trip for 15 cents. School children are to have forty rides for $1.40, according to the petition.

Direct Appeal by Dallas Company.—The service department of the Dallas (Tex.) Railway, under direction of Homer Fisher, is publishing a weekly magazine, which is intended to be a medium through which railway problems can be discussed freely. No name has been chosen for the new publication, but a contest has been held in which a first prize of $15, and other prizes of $5, $3 and $1 were offered for the best suggestions for a name for this publication. The new publication will be issued weekly. The establishment of the service department at Dallas was reviewed in the ELECTRIC RAILWAY JOURNAL for Feb. 8, page 296.

Increases Its Own Rate of Fare.—The Portsmouth (Ohio) Street Railway is at odds with two villages over the rate of fare for the section between them. The company has a franchise for carrying passengers between New Boston and Sciotoville at the rate of seven tickets for a quarter. Recently it was refused an increase in New Boston. Following this the company announced that passengers would be carried from New Boston to the corporation line of Sciotoville at the old rate, with an additional straight fare of 5 cents for those who rode into the village proper, several squares distant. The commission will send a representative to look into the matter.

Regards Appeal as Futile.—Former City Counsel Spaulding Frazer, has written to Mayor Calkins of Plainfield, president of the League of New Jersey Municipalities, to the effect that contracts between the Public Service Railway and municipalities in which the railway operates, are matters of "purely internal policy" and subject to legislative action. It is the opinion of Mr. Spaulding that appeal of the fare cases to the Supreme Court would be futile. The letter was turned over to the legal committee, which has recommended to the league that no move toward an appeal to the Federal Court be made until the Court of Errors shall have decided the Public Service Railway case.

Joint Fares Increased.—The New York State Railways, Utica Lines, proposes under a supplemental tariff filed with the Public Service Commission for the Second District, to put into effect on March 9, new joint one-way and round-trip fares from Utica to various points on the lines of the Southern New York Power & Railway Company. All joint one-way fares in both directions between Utica and the Southern New York Power & Railway Company's stations will be increased, the minimum 3 cents between Utica and McCreedys, near Mohawk, and the maximum increase, 53 cents, between Utica and Oneonta. The new round-trip rate increases vary from 22 cents to as much as $1.06.

Skip Stops Will Continue.—The St. Paul Association, which concerns itself with public and business affairs in St. Paul, Minn., published in its bulletin dated Feb. 14 an interpretative analysis made by the association of the audit of the St. Paul Street Railway. This audit was made for the purpose of ascertaining whether the company actually needed the relief which it would receive by the continuance of the skip-stop system now in operation. The City Council had before it an ordinance abolishing the skip-stop system, but as a result of this audit and the attitude of the people of St. Paul as expressed through the association of 4000 business and professional men, the skip-stop system in St. Paul will be continued at least until peace is definitely concluded.

Special Cars Suggested for Workers.—"Workers' specials," operated by railways in cities to enable workmen to reach their places of employment on time, are suggested by the information and education service of the Department of Labor, as a means of reducing tardiness and absences in industrial plants. It is pointed out that in many instances workmen who realize that they will be late for work decide to remain away for the entire day. Placing a certain number of cars on a definite schedule and operating them as special cars for workmen only, with stops every six blocks or so, would do much to improve the condition in certain cities, it is suggested. Government committees in certain factories are interested in a revision of city railway schedules along this line.

One-Man Car Rights Established.—City Counsel Charles E. Bird, Trenton, N. J., has filed an opinion in which he says that the Trenton & Mercer County Traction Corporation has a legal right to operate one-man safety cars over its lines in Trenton and vicinity. The opinion was given at the request of George B. La Barre, director of public safety of Trenton, in view of the fact that the city had passed an ordinance in 1889, whereby it was made unlawful to run a car having a driver and no other agent for the control and care of passengers. Counselor Bird is of the opinion that this ordinance does not prohibit the present one-man cars, which are electrically operated. He says that the 1889 ordinance became inoperative when the Trenton Street Railway changed its motive power in 1894.

One-Man Cars to Stay.—The Mayor of Waco, Tex., has vetoed the ordinance to which reference was made recently in the ELECTRIC RAILWAY JOURNAL, requiring the Texas Electric Railway to discontinue the operation of the safety, or one-man, cars. The Commissioners of Waco finally passed the ordinance on Feb. 6, only two members of the commission voting. The fourth man, Mr. Fitzhugh, had resigned several days before on account of ill health. Had he been present Mr. Fitzhugh and the other commissioner, together with the Mayor, would undoubtedly have prevented the final passage of the measure. On the next day the Mayor disapproved the ordinance. The safety cars are popular in Waco, and the patrons living along the line on which they are operated were active in having the Mayor veto the measure. It is understood that the company plans to equip two more lines with safety cars this year.

Personal Mention

Winthrop Coffin, Brookline, Mass., has accepted the nomination to a trusteeship on the Boston (Mass.) Elevated Railway.

Woodward Hudson has been elected president of the Conway (Mass.) Electric Street Railway to succeed James H. Hustis.

Frank R. Bissell has been appointed second vice-president of the Dallas (Tex.) Railway to succeed H. M. Hughes, deceased.

Charles De Sombers has been appointed master mechanic of the Lincoln (Neb.) Traction Company to succeed John B. Blaiklock.

Norman James has been elected president of the Charlottesville & Albemarle Railway, Charlottesville, Va., to succeed F. C. Todd.

E. J. Shaylor has been appointed auditor of the Ironwood & Bessemer Railway & Light Company, Ashland, Wis., to succeed L. C. Clark.

F. J. Fish has been appointed auditor of the Rockland, Thomaston & Camden Street Railway, Rockland, Me., to succeed E. J. Thompson.

Edward J. Ives has been appointed assistant general superintendent of the Detroit (Mich.) United Railway, to succeed Paul W. Dohrman.

William Elliott has been elected vice-president of the Columbia Railway, Gas & Electric Company, Columbia, S. C., to succeed Henry Parsons.

A. J. Harter has been appointed purchasing agent of the Bamberger Electric Railroad, Salt Lake City, Utah, to succeed H. F. Barraclough.

Chapin M. Seley, Waco, Tex., son of the late W. W. Seley, has been elected an assistant treasurer of the Texas Electric Railway, Dallas, Tex.

E. M. Pottorff has been appointed chief clerk of the freight department of the Illinois Traction System, with headquarters at Springfield, Ill.

C. M. Lake has been appointed claim agent of the Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md., to succeed William L. Schulz.

William J. Poling has been appointed superintendent of transportation of the Jersey Central Traction Company, Keyport, N. J., to succeed W. A. Haley.

W. C. Edmiston has been appointed general superintendent of the Omaha & Lincoln Railway & Light Company, Ralston, Neb., to succeed E. A. Roehry.

I. W. Morris has been appointed treasurer of the Charleston Consolidated Railway & Lighting Company, Charleston, S. C., to succeed James Ball.

W. E. Campbell has been appointed chief engineer of power station of the Nashville Railway & Light Company, Nashville, Tenn., to succeed H. S. Badger.

J. E. Harvell has been appointed general superintendent of light and power of the Virginia Railway & Power Company, Norfolk, Va., to succeed H. Root Palmer.

Gerry Cathcart has been appointed claim agent of the Columbus Railway, Power & Light Company, Columbus, Ohio, to succeed E. K. Stewart, who resigned recently.

J. P. Moran has been appointed chief engineer of power station of the South Carolina Light, Power & Railways Company, Spartanburg, S. C., to succeed H. A. Parshall.

H. G. Boyter has been appointed engineer of maintenance of way of the South Carolina Light, Power & Railways Company, Spartanburg, S. C., to succeed J. P. Sellers.

L. LeMay has been appointed secretary and treasurer of the Memphis & Lake View Railway and the Memphis (Tenn.) Street Railway, to succeed W. H. Burroughs, deceased.

John Sparrow, a well-known advertising man of Birmingham, Ala., has been appointed publicity agent of the Birmingham Railway, Light & Power Company by Lee Bradley, the receiver of the company.

Albert H. Bruner, formerly with the Tri-City Railway, Davenport, Ia., and later with Stone & Webster on the arsenal at Rock Island, Ill., has accepted a position with the city of Chicago as a civil engineer engaged in the Chicago Plan Commission.

Murray Carleton has been elected second vice-president of the United Railways, St. Louis, Mo., a newly-created office. Mr. Carleton was formerly vice-president of the company. He retired from that post in October, 1918, upon the election of R. L. Warner to the company.

Sir Augustus Nanton has been elected president of the Winnipeg (Man.) Electric Railway, to succeed Sir William Mackenzie, who has been president of the company since its inception. Sir William has also retired as a director of the company. Sir Augustus was formerly vice-president of the Winnipeg Electric Railway.

C. Wright has been appointed assistant secretary and assistant treasurer of the Chattanooga Railway & Light Company, the Lookout Incline Railway of the Lookout Mountain Railway, Chattanooga, Tenn., to succeed George W. Buchanan, who resigned some time ago to accept a position with the Wright-Martin Air Craft Corporation at New Brunswick, N. J.

M. E. Graston, who has been general agent of the Union Traction Company of Indiana at Indianapolis, has bee appointed freight claim agent, succeeding W. V. Morris. Mr. Graston wil handle all matters pertaining to freigh claims, reporting to C. S. Keever, superintendent of transportation, instea of to the auditor, to whom the freigh claim agent has formerly reported. Mr Graston will remain in Indianapolis.

C. R. Collins, assistant engineer o the Puget Sound Traction, Light & Power Company, Seattle, Wash., wh left the company in 1917 to becom general superintendent of the Gray Harbor Railway & Light Company Aberdeen, Wash., has resigned his position with that company and is now i the East. Mr. Collins has announce that he expects to return to the Puge Sound Traction, Light & Power Company again, as soon as his business i the East is finished.

W. H. Sawyer, vice-president of th E. W. Clark & Company Managemen Corporation, has been elected presiden of the East St. Louis & Suburban Railway, East St. Louis Light & Powe Company, East St. Louis Railway, Alton Granite & St. Louis Traction Company, and vice-president of St. Loui & Belleville Electric Railway, Alto Gas & Electric Company and the St Louis & East St. Louis Electric Railway. H. W. Clapp as vice-president o the East St. Louis & Suburban Railwa is associated with Mr. Sawyer in connection with operating matters.

C. C. Slater has been appointed general manager and general superintendent of the Columbus Railway Power & Light Company, Columbus Ohio, as the successor of Harol W. Clapp, general manager, and W C. Campbell, general superintendent whose connection with the road cease through the establishment of reorganization plans by the new regime. Mr Slater has been a resident of Columbu for thirty years. He was in charge o the construction work of the old Publi Service Company and acted as its general superintendent for eight years. I recent years he has been interested i the coal business.

Charles B. Cooke, Jr., has been appointed assistant manager of the passenger transportation and housing division, United States Shipping Boar Emergency Fleet Corporation, in charg of the passenger transportation department. Mr. Cooke is a member o the firm of Kelly, Cooke & Company Philadelphia, well-known consulting engineers. He succeeds Garrett T. Seely who resigned recently in order to resume his duties as assistant genera manager of the Chicago Elevated Railroads. Mr. Cooke entered the government service with the Emergency Flee Corporation on April 3, 1918, when h undertook the solution of the complex passenger transportation problems i the Delaware River District which involved the construction of additiona electric railway facilities costin $2,600,000. The construction of thes facilities has been completed under hi direct supervision.

Mr. Gadsden Goes with U. G. I.

President of Charleston Consolidated Will Take Charge of National Public Relations as Vice-President of the United Gas Improvement Company

Philip H. Gadsden of Charleston, S. C., who was chairman of the American Electric Railway War Board and is now chairman of its successor, the committee on national relations of the association and also chairman of its committee on readjustment, has been elected vice-president of the United Gas Improvement Company of Philadelphia, and will take charge of a new department of national public relations of that organization.

For some time Mr. Gadsden has been president of the Charleston Consolidated Railway & Lighting Company, which is controlled by the U. G. I., but in which he is personally a heavy owner. During the war, however, he has made his headquarters at Washington, where he has attained national prominence in connection with his work in behalf of public utilities.

The new activities which Mr. Gadsden is about to undertake are not expected to interfere with his continued interest in the association work. In fact, the establishment by such an important company as the U. G. I., of a public relations organization under a vice-president, and his appointment to that office, should be of great assistance to Mr. Gadsden in the work to which he has put his hand in helping improve the status of the utilities. The example of this important company may encourage others to pay greater attention to the subject of public relations.

The United Gas Improvement Company is owner and operator of public utilities all over the country, including railway, gas and power companies. It is one of the strongest of all of the holding companies, and it operates thirty-five or forty plants, among them the Philadelphia Gas Works, which belong to the city of Philadelphia and are leased to the U. G. I. It is also the largest individual stockholder in the Public Service Corporation of New Jersey.

GETTING CO-OPERATION WITH THE DIFFERENT BRANCHES

In a way, Mr. Gadsden is expected in his new work to carry out many of the policies which have made him a national figure in the public utility field during the war. Speaking broadly, Mr. Gadsden has been occupied with "putting the public utilities of the country on the national map." Their true condition has been presented clearly and convincingly to congressional committees and government officers, and the sentiment in Washington is now much more favorable to these properties than before. In this work Mr. Gadsden has been equally successful in bringing about a co-operation on the part of the three branches of the public utilities industry, and leading them to think in terms of the industry rather than in terms of their own special interests. He has assisted in arousing a consciousness among public utility men that they are part of a great national industry instead of being merely officials of local plants and local industries.

HIS ATTITUDE TOWARD THE NEWSPAPERS AND CIVIC SERVICE

Those who know Mr. Gadsden well describe him as a man of charm and winning personality. In this connection a story is told: When he first came to Washington and it seemed desirable for him to become acquainted with important newspaper correspondents on duty at the national capital who might assist in telling the true story of the difficulties of the public utilities to the people of the country through the newspapers, it was suggested by a friend that one important correspondent could be brought to call on Mr. Gadsden.

P. H. GADSDEN

"Not at all," Mr. Gadsden said; "if this gentleman is to do me a favor, it is I who will call on him."

By doing so he made a friendship, which will in all probability be a lasting one, with a newspaper correspondent who during the Peace Conference in Paris, has been representing a great group of American readers at the elbow of President Wilson in Europe. Other instances of formation of similar friendships with those who address the public constantly through the newspapers are available although perhaps unnecessary.

Another story of Mr. Gadsden's public relations ideas is told: When and after the U. G. I. leased the Charleston property in 1910, and Mr. Gadsden discussed public relations with his associates at Charleston, he impressed the necessity of taking part in all local movements upon the Charleston staff with the result that upon one occasion so many officials and employees of the Charleston company were taking part in civic movements and local affairs that the company began to feel the loss of their time from its own affairs. Mr. Gadsden tells this story to illustrate the point that community leaders welcome the assistance of public utility men in home affairs.

This knowledge of human relations, of courtesy and of etiquette is expected to stand Mr. Gadsden in good stead in his new work, and he has other special qualifications for a position which will require a closer contact between the public and the public utilities with which he is identified.

SOME BIOGRAPHICAL FACTS

A man of broad reading and experience, Mr. Gadsden was born in Charleston fifty-one years ago. He was educated in the schools of that city, and afterward in the South Carolina University, at Columbia. The same university has conferred upon him the degree of LL.D. He is a lawyer, and has practiced at the bar for fifteen years. He was a member of the South Carolina Legislature for six years, elected by the people for three successive terms, and one of the most interesting sidelights upon his character is the fact that he is the man who was largely responsible for putting the word "Enforce" in the League to Enforce Peace, without which, it was noted in the public prints at the time, the league would have had merely the name of a pacifist organization. The incident is related by his friends to show the virility of his mind. He is one of the charter members of the League to Enforce Peace.

As a consequence of his work for the public utilities during the war, Mr. Gadsden is being constantly sought to make speeches, and because of the national prominence he has assisted in giving to the difficulties of the public utilities he is now being urged to write articles from time to time concerning these difficulties for such popular magazines as *Everybody's* and others.

Appointments Made to New Jersey Commission

Governor Edge of New Jersey, has appointed Harry L. Knight, Burlington County, and Andrew Gaul, Jr., Bergen County, members of the Board of Public Utility Commissioners of that State. Each term runs for six years at an annual salary of $7,500. Mr. Knight succeeds Ralph W. E. Donges, Camden, who resigned to enter the military service. Mr. Gaul was appointed under the act of 1918 increasing the number of commissioners from three to five. A bill is now before the Legislature to make the commissioners of the future elective.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Fare Register Production Goes Ahead

The Demand Is Greater Than Ever Before with Bright Outlook for the Future

The change from a peace to a war basis caused many manufacturing companies to curtail the output of their regular products in order to take up new lines of work to satisfy government contracts. One company manufacturing fare-recording instruments used largely by interurban railways where the zoning system is employed has reported that "even with our new buildings and all additional equipment, we had to encroach upon the register production to a certain extent, but the 1918 volume of register business, as compared with 1917, shows an increase, both as compared to the registers in use and the number shipped."

"The war," it was stated, "brought many problems to the electric railway people. Quick changes in fare rates had to be made and the advantages of flexibility and adaptability became at once apparent. Changes were made in register mountings, or the particular type of register in use was often replaced by another type with the proper capacity to meet the new conditions.

"Now that the war is over, even though we are still working pretty strenuously on our Navy contracts, yet we are preparing for bigger things than ever before in the manufacture of our regular products. Our reserve stock must not only be brought up, but the companies, which have been delayed for a time in receiving their new registers must not be kept waiting. The demand for registers is now greater than it has ever been, and the situation assures us as to the future success of the register business.

"We shall no doubt see many improvements perfected. During the coming year we anticipate a big increase in the number of machines for city use which will have to be built, especially for use in connection with our pay-as-you-enter operating equipments."

Inquiries for Rail Welders

Much Activity Anticipated by April—Giving of Guarantees Against Defective Joints Being Considered

The mild and open winter has brought to notice rather earlier this year than ordinarily the maintenance of track equipment. Although few orders have actually been placed much information has been required from manufacturers of rail welding equipment for welders, grinders and supplies. The manufacturers are looking for real activity in the market in April.

Rails of rather low carbon content have presented no difficulties for electric welding, and at the present time high carbon rails are being welded very successfully. One manufacturer is considering the advisability of placing a guarantee of a certain number of years against defective rail joints electrically welded under the supervision of one of their foremen.

Cord Prices Appear Stabilized

Cost of Cotton Not Sufficiently Low to Warrant Reduction on Bell, Register and Trolley Rope

Reduction in the price of spot cotton at New York cannot, according to manufacturing opinion, be taken as the measure of trolley rope, bell and register cord selling price changes at this time. It is pointed out that the price of raw material at the factory does not closely follow the speculative movements in the cotton market and that there is a substantial difference between exchange prices and delivery costs at the factory door. The changes in the latter have not yet been sufficient to warrant any decided price reductions, especially as the manufacturers of such material are doing their best to maintain liberal wages. Little sign of early wage reductions can be seen and the future labor cost in production is complicated by the unsettled conditions, especially in the New England textile field. In some cases labor costs have been increased in the past half-year. A drop of 5 or 6 cents per pound in the cost of cotton would probably be shared with the consumer.

Some street railways within a few weeks have paid as high as 75 cents per pound for trolley rope, and if cotton prices continue to reflect downward tendencies, it is fair to assume that prices will be shaded somewhat. The manufacturers are generally in shape to make good deliveries. All manufacturing costs are still high, and while manufacturers are unwilling to make public their data or pass upon the accuracy of estimates of the ratio of labor to material costs, it is certain that both classes of costs are so important that there will have to be very substantial reductions in either or both together before prices can really approach pre-war levels. The demand is rather moderate for these materials and it can be increased a great deal before an adverse effect would be noted on deliveries.

Cancellation Privilege Abused

Suggestion Is Made That Manufacturers Require Payment of a Charge for Cancellation

Immediately upon the signing of the armistice in November last manufacturers began to receive cancellation orders not only from the government, but also from other customers. Even where orders were supposed to be firm, cancellations came in.

Electrical manufacturers, of course, were hard hit by this situation because long deliveries had occasioned the placing of orders far in advance. On some of the large equipment, for instance, it was impossible in November to get promises of deliveries for any period prior to 1920.

MANUFACTURERS RESPONSIBLE FOR PRESENT CONDITION

Of course, the manufacturers are really to blame for allowing the practice of cancellation to go as far as it has. To be sure, the manufacturer in the past has felt that if the customers could be accommodated without too much trouble or expense it was the proper thing to do. As a result the cancellation privilege has been abused and the manufacturers in order to protect themselves and their employees are rapidly being forced to take some vigorous action.

It has been suggested by a prominent electrical manufacturer that the remedy for this abuse is a cancellation charge. The manufacturer has been put to a certain expense in taking and holding the order. With an accumulation of orders he may have gone ahead and made arrangements for raw materials, new machinery, additional labor, additional factory space, etc. Besides, it costs a certain amount of money just to book an order and the same work to take that order off the books.

Some one has to pay these charges. If the one cancelling the order doesn't, the charges go against general expense and must therefore be absorbed by the customer who sticks by his contract.

The manufacturers have to pay such a charge to get out of their raw-material contracts. Only a couple of weeks ago an instance came up where a cable manufacturer paid $45,000 to be released from his cotton-yarn contract. If such is the condition, it does not seem unreasonable to require a cancellation charge of the manufacturer's customer where cancellation is allowed.

Brill Sales Doubled

Without Aeroplane Sales the Combined Output During the Year 1918 Totaled $16,761,000

The sales value of the combined output of the three plants wholly operated by the J. G. Brill Company, Philadelphia, Pa., showed an enormous increase to $16,761,145 for the calendar year 1918 as compared to $7,706,099 in 1917 and $6,180,895 in 1916. This 1918 figure does not include the $2,280,000 sales value of aeroplanes from the Springfield Aircraft Corporation, in which the company has an interest. The sales record of the other plants since 1907 follows:

1907......	$9,211,825	1913......	$9,154,433
1908......	3,845,173	1914......	4,903,510
1909......	4,261,204	1915......	4,403,116
1910......	5,960,778	1916......	6,180,895
1911......	5,870,907	1917......	7,706,099
1912......	7,842,090	1918......	16,761,154

The combined result of operation was a profit of $1,341,509, after deducting all amounts expended for maintenance and repair during the year and after making allowances for depreciation and for amortization of equipment obtained for special government production. From this profit must be paid federal income and war profits taxes, estimated at $425,000. Upon this basis the net profit for the year would be $916,509.

CANCELLATIONS OF CONTRACT FOLLOWS ARMISTICE DECLARATION

During practically the entire year the company, especially at its Philadelphia plant, was engaged almost exclusively in the execution of orders for cars, trucks and field equipment received from the war departments of the government. After the signing of the armistice, the company, like most others manufacturing material for the government, was asked gradually to decrease its production and to accept cancellations on some of the orders which had been placed with it.

The orders that the company had from the government were all in proper contract form and contained the proper clauses for cancellation and for adjustment, if cancelled. Final adjustments are now in process of being made. Notwithstanding the cancellations of contracts for government work, the company had on hand, as of Feb. 1, 1919, work amounting to $8,204,448, including the government work which will not be cancelled. The Wason Company is now making preparation to operate its plant in the production of cars instead of aeroplanes.

NEED FOR WORKING CAPITAL MAKES DIVIDEND INADVISABLE

Notwithstanding the profit earned during 1918 and the previous year, the great demand for working capital, owing to the largely increased business, made it inadvisable, in the opinion of the board of directors, to declare dividends on the preferred stock in excess of the yearly rate of 4 per cent which has been maintained for the last few years, and dividends of 4 per cent for the year paid in reduction of the accumulated preferred stock dividends. A quarterly dividend of 1 per cent and a dividend of 3 per cent in reduction of the accumulated unpaid dividends on the preferred stock were declared and paid on Feb. 1, 1919. The remaining accumulated dividends on the preferred stock now amount to 6½ per cent.

Rolling Stock

Levis County Railway, Levis, Que., is building one single-truck steel one-man car.

Salina (Kan.) Street Railway reports that it may purchase two second-hand one-man cars or bodies.

Austin (Tex.) Street Railway, expects to purchase four safety cars employing features of their own design.

Washington & Old Dominion Railway, Washington, D. C., expects to build one 50-ton locomotive this year.

Tiffin, Fostoria & Eastern Electric Railway, Tiffin, Ohio, may possibly purchase a few freight trail cars this year.

Springfield (Mo.) Traction Company has received eight of the thirty-two cars which are being remodeled into pay-as-you-enter type.

Columbus, Delaware & Marion Electric Company, Columbus, Ohio, may possibly build several additional freight cars in its own shops.

Pennsylvania & Ohio Railway, Ashtabula, Ohio, expects some time this year to purchase one quadruple equipment for one interurban car.

Chicago, South Bend & Northern Indiana Traction Company, South Bend, Ind., lost its main carhouse in a fire recently. Nine city cars were burned at a loss estimated at $50,000. A car stalled on the track and prevented the employees from saving the others.

Washington Railway & Electric Company, Washington, D. C., and Capital Traction Company, it is reported, are to be ordered by the Public Utilities Commission to equip all their hand-brake passenger cars with air brakes. The same report states that there are more than 125 cars of the former company and but few of the latter company which will come under this ruling, all told at an estimated cost of $75,000.

Brooklyn (N. Y.) Rapid Transit Company, through its receiver Lindley M. Garrison, has been authorized by Judge Mayer in the Federal Court to cancel the contract of May 11, 1918, with the Jewett Car Company of Newark, Ohio, for construction and delivery of fifty car bodies for use on the surface lines at a cost of $266,000. The order recites that the contractor has gone into the hands of a receiver without completing the order, and authorizes the receiver to take steps to obtain needed equipment elsewhere. The order for 100 cars mentioned last week as being let to the Brill Company did not include these fifty cars.

Trade Notes

Delos F. Wilcox is engaged in practice as a consulting franchise and public utility expert with offices at 73 Gleane Street, Elmhurst, N. Y.

Edward H. Mays, president of E. G. Long Company, New York, will leave on March 1 for the Far East to give personal attention to his company's interests in Japan and China.

Epping-Carpenter Pump Company, Pittsburgh, Pa., announces that Theodore R. Hermanson, formerly of the Harrison Works of the Worthington Machinery Corporation, has become its works manager.

Western Electric Company has announced that D. J. Butts, manager of the Los Angeles branch since March, 1917, has been appointed sales manager at San Francisco. H. L. Harper has been transferred from Kansas City to take charge of the Los Angeles house.

Valentine J. Burger, D. S. C., first lieutenant, aviator observer with the French and American air forces, has recently returned to the Standard Underground Cable Company, where he resumes charge as the New York manager of exports. He was the guest of honor at a presentation luncheon tendered by the New York officers of the company on Feb. 13 at the Railway Club. C. J. Marsh, vice-president of the Standard Underground, acted as chairman, and with him were T. L. Wiley, Eastern manager, R. S. Hopkins, assistant Eastern manager, and other members of the New York construction, sales and office force. Lieut. Burger received the distinguished service cross, the French croix de guerre with palm and star, and is cited for oak leaf to the D. S. C., another palm to the French cross and for the Congressional medal of honor. He rendered repeatedly distinguished service under great personal danger and has been officially credited with three Boche planes.

New Advertising Literature

Wayne Oil Tank & Pump Company, Fort Wayne, Ind.: Booklet dealing with storage and distribution systems for oils, varnishes, gasoline, etc.

Wilson Welder & Metals Company, Inc., New York City: Bulletin on the "Repair of the German Ships," showing the use of plastic arc welding in placing these ships back in service.

Wilson Welder & Metals Company, Inc., New York City: Bulletin on the "Repair of the German Ships," showing the use of plastic-arc welding in placing these ships back in service.

Crescent Belt Fastener Company, New York City: Bulletin covering "The Crescent Principle of Belt Joining" containing a ready reference service chart for determining the correct type of belt fastener to use for any condition of work.

Track and Roadway

Calgary (Alta.) Municipal Railway.—The Calgary Municipal Railway is considering the construction of a single-track extension of the Center Street line to Sixteenth Street.

San Francisco-Oakland Terminal Railways, San Francisco, Cal.—The installation of loop service on all connecting lines, the replacement of light rails with heavy ones on all paved streets and the construction of new cars and reconstruction of old rolling stock are among the proposed improvements now being inaugurated by the San Francisco-Oakland Terminal Railways.

Peninsular Railway, San Jose, Cal.—About $100,000 is being spent by the Peninsular Railway on improvements to its line.

Honolulu Rapid Transit & Land Company, Honolulu, Hawaii.—Work will soon be begun by the Honolulu Rapid Transit & Land Company on the double-tracking of King Street from Alapai to Punahou Street. The construction of several extensions is under consideration by the company.

Waterloo, Cedar Falls & Northern Railway, Waterloo, Iowa.—The Waterloo, Cedar Falls & Northern Railway will install safety devices at its crossings.

New Orleans Railway & Light Company, New Orleans, La.—Efforts to establish an extension of the line of the New Orleans Railway & Light Company to the shipbuilding plant of the Foundation Company on the industrial canal were furthered at a recent conference held at the Mayor's office. It was practically decided to bring the matter before Judge Foster in the United States Court. Part of the extension has already been constructed, but work has been halted on account of the appointment of a receiver for the company. The extension would cost about $50,000.

Kansas City, Mo.—The Board of Public Works of Kansas City, F. E. McCabe, secretary, will receive bids until March 11 for the construction of the Twenty-third Street viaduct. The main viaduct will be approximately 1726 ft. long with sidewalk, roadway and separate space for car tracks; the Wyoming Street approach approximately 940 ft. long with sidewalk, roadway and car tracks in the center and the Frisco yard approach, roadway only.

Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo.—It is reported that the Kansas City, Clay County & St. Joseph Railway will construct an extension from St. Joseph to Omaha and from Excelsior Springs eastward, with Richmond as its first objective.

La Grange, Toledo & Eastern Railway, La Grange, Mo.—The Indiana Public Service Commission has authorized the La Grange, Toledo & Eastern Railway to issue $55,000 of common stock at par and $35,000 of bonds at par to finance the rehabilitation of that part of the defunct St. Joseph Valley Railway between La Grange and Mongo. This part of the old road connects at La Grange with a division of the Pennsylvania lines.

Toronto (Ont.) Railway.—It is reported that efforts will be made to complete the Pape Avenue line of the Toronto Railway this year.

Philadelphia, Pa.—At a conference held on Feb. 17 by Mayor Smith and William S. Twining, director of the Department of City Transit, it was decided that work on the Frankford elevated line will be resumed at once and will be pushed to completion as rapidly as possible. Permission has been granted by the Public Service Commission of Pennsylvania to complete that portion of the line on Front Street between Callowhill and Arch Streets where connection is to be made with the Market Street subway. Plans for this extension are well advanced and advertising for proposals for a portion of the work will be begun within a few weeks.

Prince Edward Island Railway, Charlottetown, P. E. I.—Third-rails are being installed on 60 miles of this company's line from Borden north to Emerald, thence east and west to Charlottetown and Summerside. Since the spring of 1918 progress has been steadily made in widening roadbeds, reinforcing or rebuilding bridges and culverts and laying the third-rail. The work at the beginning of December was 75 per cent finished and suspended for the winter. It is intended to resume work in the spring.

Saskatoon (Sask.) Municipal Railway.—The City Council of Saskatoon has under consideration the construction of an extension of the Saskatoon Municipal Railway at an estimated cost of $46,000.

Knoxville Railway & Light Company, Knoxville, Tenn.—Plans have been prepared and work will be begun early in April on the construction of a new reinforced concrete viaduct on Gay Street, crossing the Southern Railway tracks. It is estimated that the cost of the viaduct will be about $500,000. It is expected that the Knoxville Railway & Light Company and the Southern Railway will share their proportionate cost of the project.

Texas Electric Railway, Dallas, Tex.—It is reported that the Texas Electric Railway will take steps soon to carry out its deferred project of extending its line from Waco south to San Antonio, via Austin, a distance of about 185 miles. The plans involve the construction of power station in the city of Austin.

Mineral Wells, Tex.—W. J. Walder of Mineral Wells and associates are promoting the construction of an interurban electric railway between Fort Worth and Mineral Wells, about 65 miles. It is possible that the proposed line may be extended as far west as Cisco.

Power Houses, Shops and Buildings

Pacific Electric Railway, Los Angeles, Cal.—Plans have been approved by the Board of Harbor Commissioners for the new passenger and freight station to be erected at San Pedro by the Pacific Electric Railway. The new structure is expected to be completed within seven months and is estimated to cost about $50,000.

Cairo Railway & Light System, Cairo, Ill.—A new 2000-kw. turbine generator has been ordered by the Cairo Railway & Light System from the General Electric Company, Schenectady, N. Y.

Chicago, South Bend & Northern Indiana Railway, South Bend, Ind.—Fire recently destroyed the main carhouse of the Chicago, South Bend & Northern Indiana Railway. Nine city cars were burned at a loss which is estimated at $50,000.

Boston, Mass.—Sealed bids will be received by the Transit Department of the City of Boston until Feb. 25 for furnishing and installing roof lights in the Massachusetts Avenue surface station of the Boylston Street subway. Specifications and forms of contract can be obtained at 15 Beacon Street.

London & Port Stanley Railway, London, Ont.—A new station will be built by the London Railway Commission at St. Thomas. The commission will also alter the present station of the London & Port Stanley Railway at Port Stanley and build a new freight house.

London, (Ont.) Street Railway.—The London Street Railway contemplates making some alterations and slight extensions to its shops.

Philadelphia & Western Railway, Upper Darby, Pa.—Work has recently been begun by the Philadelphia & Western Railway on the construction of two new electric substations at Villa Nova and Beechwood, Pa. The structures are estimated to cost approximately $20,000 each. H. P. Friend, Norristown, has the contract for the erection of the buildings.

Charlestpn Consolidated Railway & Lighting Company, Charleston, S. C.—The Charleston Consolidated Railway & Lighting Company is considering the increase of its common stock by $1,500,000 to pay for extensive improvements recently made and now being installed. The company is enlarging its power house and completing a duplicate high tension line from the power house to the Port Terminal at North Charleston at an estimated cost of about $700,000. It has just completed the installation of a third generating set at its gas plant, increasing its capacity about 50 per cent.

Virginia Railway & Power Company, Norfolk, Va.—A new generator is being installed at the Reeves Avenue power plant of the Virginia Railway & Power Company.

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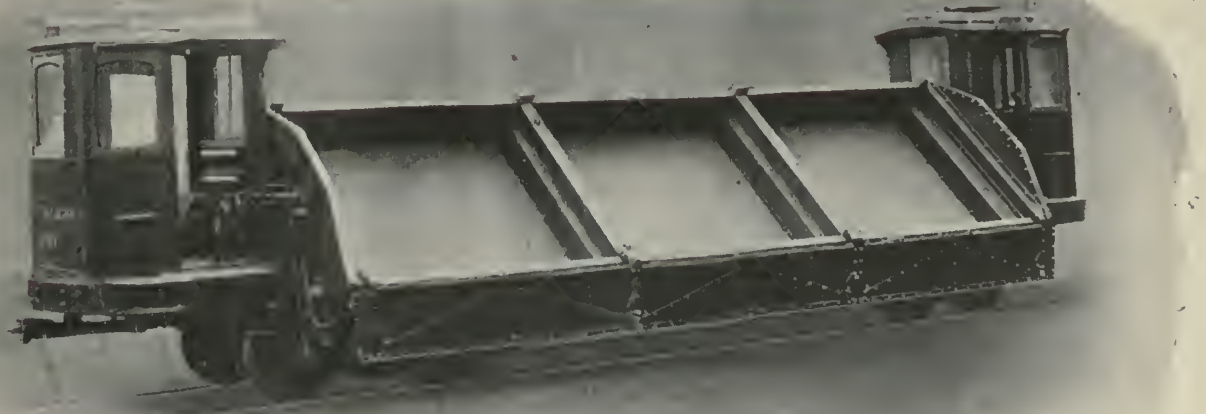

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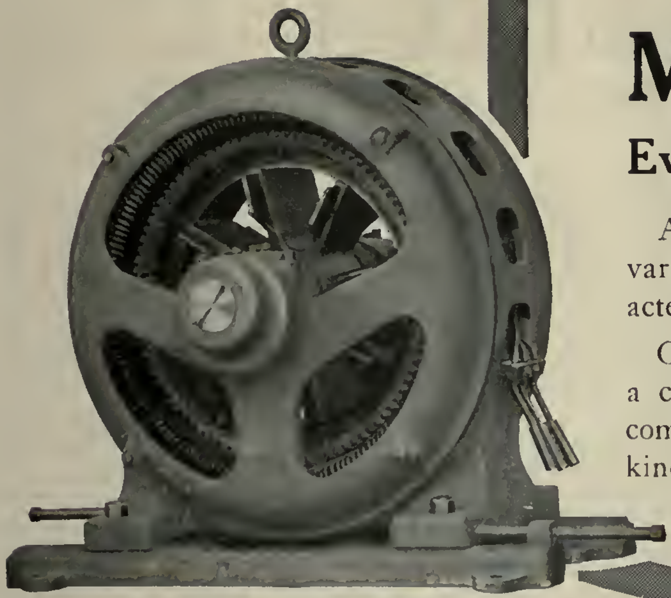

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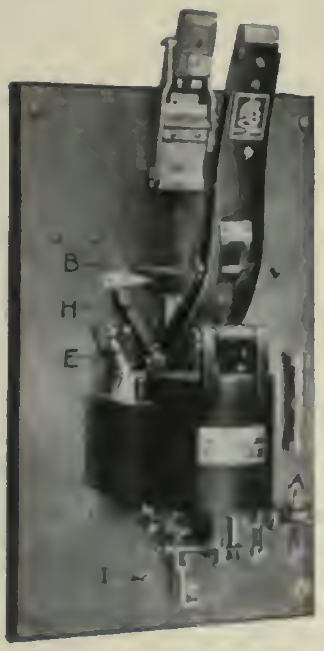

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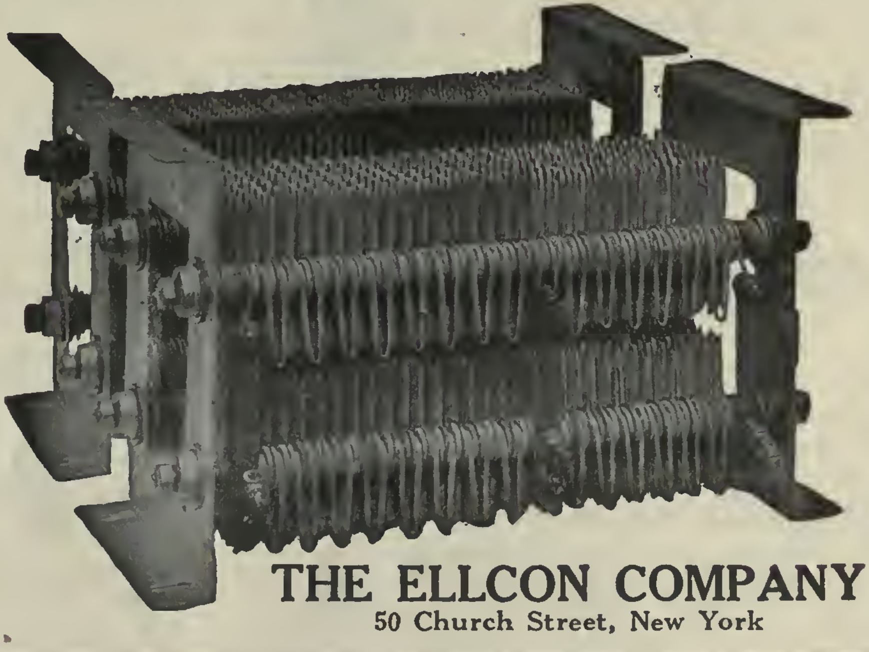

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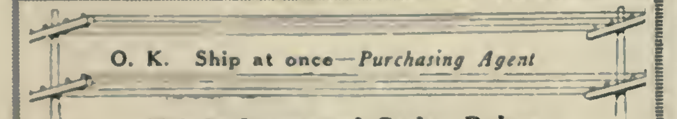
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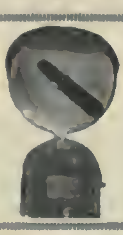

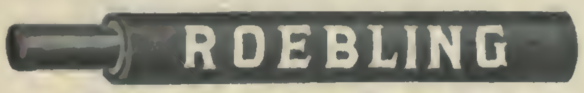

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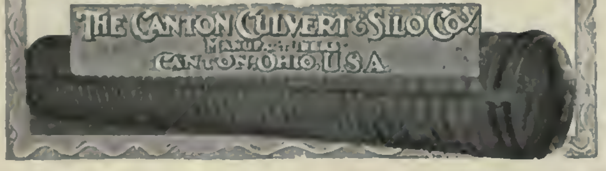

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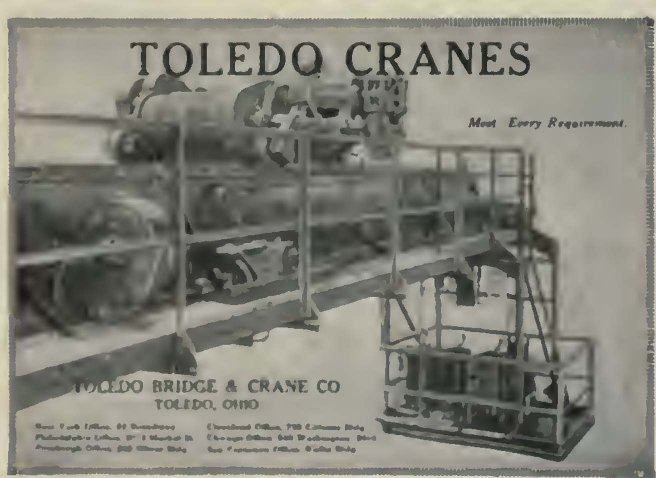

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Branch Offices: New York, Pittsburgh, Philadelphia, Atlanta, Chicago, St. Louis, Denver, San Francisco.

The Big Three

D & W Fuses, Deltabeston Wire
D & W Oil Fuse Cutouts

D & W Fuse Co., Providence, R. I.

INSULATING TAPE
of
Quality

STANDARD
Woven Fabric Co.
Walpole, Mass.

IMPERIAL WELDING AND CUTTING **EQUIPMENT**
OXY-ACETYLENE PROCESS

QUALITY

Welds everything in metal—cuts anything in steel or wrought iron. Excels in Speed, Safety, Efficiency and Economy. Write for Free Catalog.
The Imperial Brass Mfg. Co., 525 S. Racine Ave., Chicago

M-R INSULATION M'F'G CO

"Everything in Insulation"

Mica	Waxes
Vulcanized Fibre	Asphalts
Varnished Cloth	Compounds
Insulating Tapes	Insulating Varnish

The above are only a few of our products
Write us for anything in this line you may require.

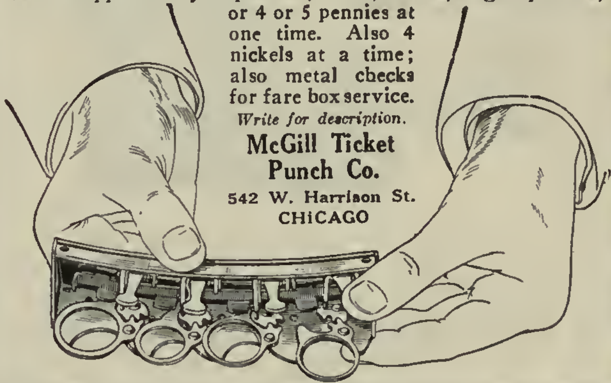
MITCHELL-RAND M'F'G CO.
103 John St., New York City

A Great Improvement in Coin Changers

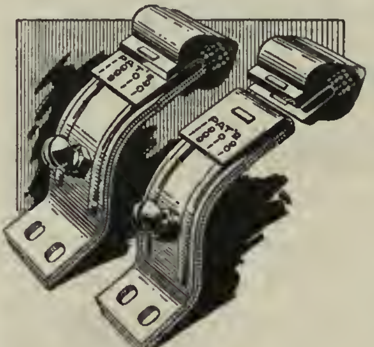
The McGill HIGH-SPEED Lever-operated Changer is now built with a gear movement instead of a curved cam. If desired a fifth barrel can be attached, which will meet all practical requirements of fare collections. The new machine can be supplied to eject quarters, dimes, nickels, single pennies, or 4 or 5 pennies at one time. Also 4 nickels at a time; also metal checks for fare box service.

Write for description.

McGill Ticket Punch Co.
542 W. Harrison St.
CHICAGO



The Trigger-Lock Reversible Controller Finger



saves Labor, Time and Money. Used as standard on

200 Roads

U. S. Factory
814-8 Bath Ave.
Niagara Falls, N. Y.

Canadian Factory
557 King St. West.
Toronto, Canada.

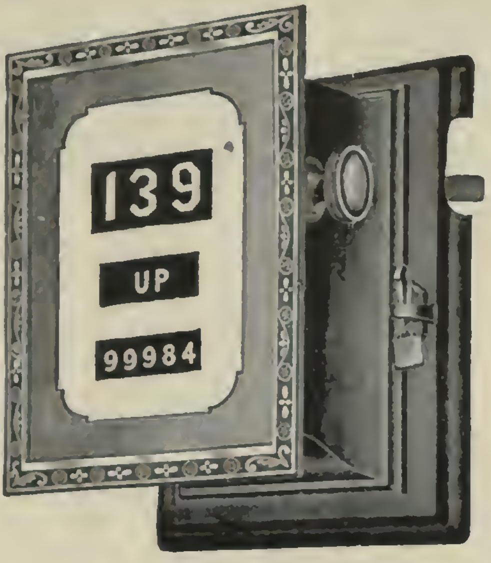
FORD TRIBLOC

A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only Block that carries a five-year guarantee.

FORD CHAIN BLOCK & MFG. CO.
Second and Diamond Sts., Philadelphia

Simplex Jacks
for
Railroads-Contractors-Industries
Automobiles-Pole Pulling and Ordnance

Templeton, Kenly & Co., Ltd.
Established 1899
London Chicago Paris



Fare Registers

Repair Parts for Registers.

Repairing at Short Notice.

EXELL MANUFACTURING CO.
NEW HAVEN, CONN.

Hale and Kilburn

No. 108, Concave Seat
For One-Man and Other Cars

Only four parts—Steel Aisle End Support, Steel Wall End Support, hardwood-framed Rattan Cushion and Rattan Back. Note new yokeless pedestal and concave cushion

This No. 108 seat is only ONE-HALF THE WEIGHT OF SEATS WITH IRON CASTINGS.

Hale and Kilburn Corp.

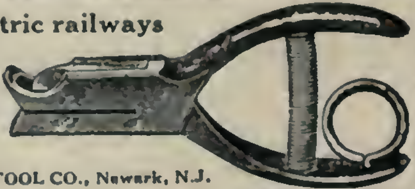
Philadelphia New York Chicago
Washington Atlanta San Francisco Detroit

"It Behooves You to Hooverize Your Motormen"

We can help you

Write to

The Arthur Power-Saving Recorder Co.
2nd National Bank Bldg., New Haven, Conn.



75% of the electric railways
use
B-V Punches
Send for Catalog.
BONNEY-VEHSLAGE TOOL CO., Newark, N.J.

Use them in your terminals—
PEREY TURNSTILES or PASSIMETERS
Faster than the ticket seller
Perey Manufacturing Co., Inc.
30 Church Street, New York City

Heating and Ventilating

Let us demonstrate to you how we can heat and ventilate your cars at the lowest possible cost

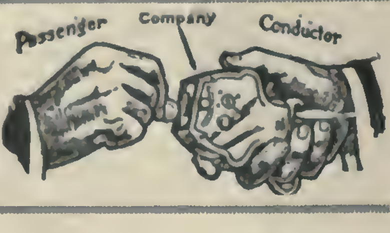
The Cooper Heater Company
Carlisle, Pa.

The Economy Railway Meter
Induces
Power Saving.
Our power-saving bulletins will vitally interest you right now. Ask for them.
Economy Electric Devices Co., Chicago

Bonham Traffic Recorders

Show origin and destination of every fare collected as well as other valuable traffic data.

The Bonham Recorder Co., Hamilton, O.



Direct
Automatic
Registration
By the
Passenger
Rooke Automatic
Register Co.
Providence, R. I.

When you want

Men

Put your advertising for them on the same basis as other publicity.

If you want competent and efficient assistants, experienced in the field served by this journal, you will naturally find such men among our readers—which include the keenest and most progressive men in the industry.

Get in touch with a number of these men and select the one that is best suited for your needs.

Only $1.50 for 30 words

401

International Specialties Cover the Entire Range of Fare Collection

Money-counting fare boxes; Coin and metal ticket-counting fare boxes; Coin registers; Coin and transfer registers; Coin, metal ticket and transfer registers; Motor-driven coin and transfer registers; Motor-driven registers for station, ferry, park and terminal use; Metal and paper registers with single hopper; Round and square registers; Transfer printers; Heeren Enameled Badges; Punches and Bell Cord.

The International Register Company
15 South Throop Street, Chicago

PYRAMID BRUSHES

FOR RAILWAY SERVICE

Brushes used in railway service operate under very severe conditions. In order to meet all requirements brushes should give long mileage and at the same time reduce commutator maintenance to a minimum. PYRAMID Brushes combine all the desirable characteristics of a good railway motor brush.

National Carbon Company, Inc.
Cleveland, Ohio

WE CAN CUT YOUR COST OF
HEATING CURRENT
Write for THERMOSTATIC CONTROL INFORMATION

GOLD

ELECTRIC HEATERS Cut Installation and Maintenance Charge.
VENTILATORS Also Ventilate in Stormy Weather.
THERMOSTATS Save Current.
ORIGINATED the use of **NON-CORROSIVE** Wire for Electric Car Heaters.
ORIGINATED The Ventilated Coil Support.

LET US FIGURE ON YOUR NEXT REQUIREMENTS
Gold Car Heating & Lighting Co., 17 Battery Pl., New York

Electric car heaters—thermostatic control—pneumatic car door operators—buzzers, single-stroke bells, starting signal lights—special resistances.

CONSOLIDATED CAR HEATING CO.
ALBANY, NEW YORK, CHICAGO

FUEL CONSERVATION

is a necessity and the heating and ventilating of street cars should be accomplished the most economical way. Our Hot Air Forced Ventilation Equipment combines heat with ventilation at a saving of 50% to 70% over electric heat.

THE PETER SMITH HEATER CO. DETROIT, MICH.

"Boyerized" Products Reduce Maintenance

Bemis Trucks
Case Hardened Brake Pins
Case Hardened Bushings
Case Hardened Nuts and Bolts
Manganese Brake Heads
Manganese Transom Plates
Manganese Body Bushings
Bronze Axle Bearings

Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

Bemis Car Truck Co., Springfield, Mass.

MASON SAFETY TREAD—Lead or carborundum filled non-slippery; prevents accidents; cuts out damage suits.

KARBOLITH CAR FLOORING—For steel cars; is sanitary, light weight fire proof, non-slippery.

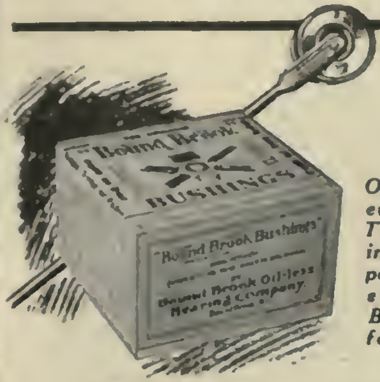
STANWOOD STEPS—Self-cleaning, non-slippery, light.

Over six million feet used without accident being reported within the knowledge of manufacturer.

Our products used on all leading railroads on cars and stations. For details address:

AMERICAN MASON SAFETY TREAD CO., Lowell, Mass.
Branch Offices: Boston, New York City, Philadelphia.
Agencies in all principal cities.

There Is Only ONE Oil-less Bushing for Trolley Wheels



On the inside of every Bound Brook Trolley Wheel Bushing the graphite-packed grooves spell the name BOUND BROOK—for your protection.

BOUND-BROOK
GRAPHITE AND BRONZE
Oil-less Bushings

The only trolley wheel bushing that actually saves wear and trouble is Bound Brook—*Oil-less.* It is the only bushing that insures permanent lubrication, whether attended to or not. It is the only bushing with the name—BOUND BROOK—impressed on the inside as an unfailing identification. It is your *proof,* when you insist upon the genuine.

All Genuine Graphited Oil-Less Bushings have always been made at Bound Brook, U. S. A.

BOUND BROOK OIL-LESS BEARING CO.
"Specialists in the manufacture of Oil-less Bushings for more than a third of a century."
Bound Brook, New Jersey

Pedigreed Gears

THE registering of every Nuttall Gear was begun more than twelve years ago. By giving each gear an identity, it made possible the gathering of a great mass of data on gear performance, and the results are evident in the superior quality of Nuttall Gears and Nuttall Engineering Service today.

But Nuttall is not resting content with what has been done. It has not for a single moment relaxed its efforts to produce better and better gears. So Nuttall registration continues not only for your protection but as a means of achieving still greater results.

R. D. NUTTALL CO.
Pittsburgh, Pa.

Nuttall Gears
EVERY GEAR REGISTERED

Holden & White Inc.

Electric Railway Sales Distributors for:

Anderson Brake Slack Adjusters.
Garland Ventilators. Miller Trolley Shoe.
Perry-Hartman Center Plates and Side Bearings.
Watson Car Lighting Regulator.
Wasson Air-Retrieving Trolley Bases (U. S.).
Reliance Air Sanders. Air Rectifier.

Chicago District Representatives for:

Drew Line Material
Columbia Car & Shop Equipment
Lincoln Rail Bonding and Bonds
Atlantic Equipments for Joint Welding

817 Fisher Building CHICAGO

When writing to Advertisers in this publication you will confer a favor on both publisher and advertiser by mentioning the Electric Railway Journal

PROVIDENCE **H-B**
FENDERS LIFE GUARDS
The Consolidated Car Fender Co., Providence, R. I.
Manufacturers of The Providence Fender and H-B Life Guard
Wendell & MacDuffie Co., 61 Broadway, New York
General Sales Agents

BRAKE SHOE STANDARDS

SAVE MATERIAL
SAVE LABOR
SAVE TIME
SAVE MONEY

Ask Us?

American Brake Shoe & Foundry Co.
30 Church Street, New York
McCormick Bldg., Chicago Chattanooga, Tenn.

Get Your Wants into the Searchlight

ADVERTISING RATES

Ads Set in Uniform Style

(Solid, in one paragraph, without display.)

THREE CENTS A WORD, minimum charge 50 cents an insertion, payable in advance, less 10 per cent. if one payment is made in advance for four continuous insertions—for advertisements under:

Positions Wanted
Evening Work Wanted
Vacation Work Wanted
Tutoring
Salesman Wants Connections

FIVE CENTS A WORD, minimum charge $1.50 an insertion, for advertisement under:

Agencies Wanted
Agents Wanted
Business Opportunities
Desk Room for Rent
Educational
Employment Agencies
Desk Room Wanted
Foreign Business
Positions Vacant
Partner Wanted
Representations Wanted
Salesmen Wanted
Patents for Sale
Plants for Sale
Sub-Contracts Wanted
Work Wanted

Miscellaneous for Sale, for Rent or Want Ads.

THIRTY CENTS A LINE, minimum five lines, for all undisplayed advertisements set with a paragraph for each item or tabulated.

THREE DOLLARS AND SIXTY CENTS AN INCH for advertisements for bids (Official Proposals).

Ads Set in Display Type

(Individual space, within border rules).

Space for these advertisements is sold by the inch. Each page contains 30 inches. The rate per inch is based on the *total* number of inches to be used—that is, the number of inches the advertisement is to occupy multiplied by the number of insertions it is to receive. For instance, a 2-inch advertisement in 2 issues earns the 4-inch rate of $2.90 an inch. A 1-inch space in 4 issues, or a inch space one issue, also earn the 4-inch rate.

SCHEDULE OF RATES

1 to 3 in., $3.00 an in.
4 to 7 in., 2.90 an in.
8 to 14 in., 2.80 an in.
15 to 26 in., $2.70 an in.
27 to 49 in., 2.60 an in.
50 to 99 in., 2.50 an in.

Rates for larger space furnished on request.

For quick and satisfactory results
tell the reader everything that
he will want to know

INFORMATION

ALLOW FIVE WORDS for the address, if replies are to a box number in care of any of our offices. There is no extra charge for forwarding replies.

IN REPLYING TO ADS, do not enclose original testimonials or anything that you may want returned. State your experience and qualifications in as concise and neat a manner as possible and enclose copies of your testimonials.

BE CAREFUL TO PUT ON ENVELOPE, when answering any "blind," ad. the box number in the ad, the name of the paper, and also the local address of office to which reply is sent:

36th St., at 10th Ave., New York
1570 Old Colony Bldg., Chicago
657 Leader-News Bldg., Cleveland
935 Real Estate Trust Bldg., Philadelphia
501 Rialto Bldg., San Francisco
519 Newhouse Bldg., Salt Lake City, Utah

WHEN ADVERTISING MACHINERY, use your own name and address—or a local address of some kind—so that the readers can wire direct and get quick replies. We advise also that you state in your advertisement the present location of plant that is offered for sale, or point of delivery provided you are in the market for equipment.

TO SIGN YOUR NAME and address to your advertisement begets the confidence of the reader and facilitates receiving replies. You can, however, obviate delay in receiving answers by signing your ad. only with initials (your own or others), care of your home, your office of a post-office box number in your city.

POSITIONS VACANT

CLERK wanted, experienced in electric railway accounting. State qualifications, experience and salary expected. Address A. C. Moore, Auditor, N. O. T. & L. Co., Terminal Building, Akron, Ohio.

HIGH-GRADE master mechanic wanted for street railway system in Texas city of 25,000. P-342, Elec. Ry. Journal, Chicago.

LIGHTING company creating new position of superintendent, who will take charge of distribution system, outside work, two power stations of about 6,000 K.W. capacity. Applicant must have thorough experience in station operation and acted at one time in the capacity of superintendent in charge of distribution system. Located Central Pennsylvania. P-347, Elec. Ry. Journal.

SHOP man for repairs and maintenance of street car controllers; able to take ful charge of work covering about fifty cars. Position in Georgia. State fully experience, qualifications, age, wages desired, etc. The J. G. White Management Corporation, 43 Exchange Place, New York.

THREE armature winders wanted. Michigan Railway Co., Albion, Mich.

POSITIONS WANTED

ACCOUNTANT, now assistant auditor of 200 mile Interurban road, operating several medium sized City Lines, desires connection as auditor of Interurban Line. 5 years' experience, unusual recommendations. PW-343, Elec. Ry. Journal, Chicago.

POSITIONS WANTED

ASSISTANT to chief engineer or general manager; 14 years' experience construction, operations, and engineering; general knowledge of mechanical, electrical transportation and accounting matters as related to way and structure department. Technically trained. PW-340, Elec. Ry. Journal.

ATTENTION—Street railway engineer over 10 years' experience, having been honorably discharged as major engineer U. S. Army after 20 months' service, desires to locate with growing concern where energy, strict application to duty and sound common sense methods are essentials. Have had considerable experience in revaluation work, heavy power house and building construction, power, installation and maintenance. Would consider management or organization. PW-336, Elec. Ry. Journal.

ENGINEER maintenance of way and construction engineer, technical, 15 years' experience street and interurban railways, all types track construction, designs railway structures. Extensive valuations. Age 37, married. References exchanged. PW-348, Elec. Ry. Journa Chicago.

GENERAL foreman wishes position. Several years experience as carpenter foreman and carpenter journeyman, also railway work. Married. Location immaterial. PW-346, Elec. Ry. Journal.

MAN experienced in modern shop and methods desires position as general foreman. PW-345, Elec. Ry. Journal, Phila.

POSITION wanted as car barn foreman, experienced electrician and armature winder, familiar with electric car equipment and maintainance. 33 years old and married. F. H., 736 Grove Ave., Moxham, Johnstown, Pa.

POSITIONS WANTED

POSITION wanted as working barn foreman, single truck road preferred. Can wind armatures, do any kind of wiring and controller repair. 10 years' experience both single and double truck. PW-344, Elec. Ry. Journal, Phila.

AGENTS AND SALESMEN

Electrical Supply Salesman Wanted
With several years' experience (both in purchase and sales preferred) who commands a wide Chicago acquaintance, and an established trade can better his position by addressing fully. AS-333, Elec. Ry. Journal, Chicago.

Do You Wish Representation in Italy?
Civil engineer wishes to represent American firm. Best references. F. Zucchi, 70 Via Moscova, Milan, Italy.

FOR SALE

Sale of Government Owned Transformers
Bids will be opened at 10 A. M. March 5, 1919, for any and all of 40 three-phase Transformers 2300, 2400, 2500—200, 210, 220 volts, Wagner Electric Co., manufacturers. F.O.B. cars, located in Zone Supply Office, St. Louis, Mo.; 5-50 kva., 5-25 kva., 10-15 kva., 10-10 kva., 10-5 kva. Bids to be on special forms, which with particulars can be obtained upon application to War Department, Surplus Property Div., Munitions Bldg., Washington, D. C., Refer to S. P. D. No. 324 M. E.

ROTARY CONVERTERS

1—300-kw. Westinghouse Rotary Converter, 3-ph., 60-cy., 370-v. A.C., 575-v. D.C., 600 r.p.m.
1—200-kw. Westinghouse Rotary Converter, 3-ph., 60-cy., 370-v. A.C., 575-v. D.C.
1—150-kw. Westinghouse Rotary Converter, 2 or 3-ph., 60-cy., 250-v. D.C., 720 r.p.m.

TURBINE

1—500-kw. Westg. Horizontal, 3-ph., 60-cy., 370-v. (can be rewound for any standard voltage), 3600 r.p.m., with or without condensing equipment.

ARCHER & BALDWIN, INC.
114-118 Liberty St., New York, N. Y.
Telephone 4337-4338 *Rector*

IMMEDIATE DELIVERY

Five new P.A.Y.E. double truck cars. Length, 45-ft. Equipped with 4GE Co.'s 247 Motors and G. E. Co. Air Brakes.

McGUIRE-CUMMINGS MANUFACTURING CO.
Cars and Trucks, Snow Sweepers, Electric Locomotives
111 West Monroe Street, Chicago, Ill.

10,000 Kw.
Turbo-Generator Unit
Absolutely New

10,000 Kw. Westinghouse-Parsons Horizontal Turbo-Generator Unit, 3 phase, 60 cycle, 13,800 volts, 1800 R.P.M. Can be reconnected to any other standard voltage.

Suitable surface Condenser and Condenser Auxiliaries. We own this unit ourselves and are not acting as brokers.

Send for full details and specifications

MacGovern & Company, Inc.
114 Liberty St., New York, N. Y.
Pittsburgh Office: 498 Union Arcade Bldg.

S EARCHLIGHT
S ERVICE
S ECURES
S ATISFACTORY
S ITUATIONS
S ALES

816

CAN SHIP AT ONCE. The following:

BRIDGES

good as new Steel Girder, all Cooper E-35 with [illegible] overload allowance

2—27 ft 6 in through plate girder	
1—29 ft through plate girder	
4—32 ft 6 in through plate girder	Total
4—42 ft. 6 in through plate girder	weight
2—51 ft 2 in through plate girder	771,034
2—50 ft through plate girder	lbs
1—64 ft 3 in through plate girder	
2—64 ft 3 in through plate girder	
2—64 ft. 11 in through plate girder	
1—24½ ft Deck span	
3—41 ft. Deck span	Total weight 109,902 lbs.
2—45½ ft Deck span	
1—111 ft Truss span	Weight 120,479 lbs
12—30 ft Deck spans (Viaduct)	Total
2—43 ft Deck spans (Viaduct)	weight
2—60 ft Deck spans (Viaduct)	265,650 lbs.
6—Towers and 2 single bents	30,170 lbs

M. K. FRANK
Frick Bldg., Pittsburg, Pa

RATES:

1 inch—$3.00
4 inches—$2.90 an inch

(The above rate applies to a 4-inch space in one issue, a 2-inch space in two issues, or a 1-inch space in four issues. The larger spaces following may be used up in a similar way).

8 inches—$2.80 an inch
15 inches— 2.70 an inch
27 inches— 2.60 an inch
50 inches 2.55 an inch

Rates for larger spaces furnished on application.

RAILS

15,000 TONS—NEW and RELAYERS
NEW—12 lb., 16 lb., 20 lb., 25 lb., 30 lb., 40 lb., 60 lb., 70 lb., 75 lb., 80 lb., 85 lb., 90 lb.
RELAYERS—30 lb., 35 lb., 40 lb., 45 lb., 56 lb., 60 lb., 70 lb., 80 lb., 85 lb., 90 lb., 100 lb.

Fastenings, New Bolts, Nuts and Spikes. New Frogs, Switches, Crossings and all accessories. Carload and less carload inquiries and orders a specialty. Rails cut to lengths for structural purposes. Attractive prices. Immediate shipments from stock.

L. B. FOSTER COMPANY
Park Bldg., Pittsburgh, Pa.

Cars For Sale

12 Double Truck Motor or Trailers. Brill 27-F trucks, 28-ft. closed bodies.

3 SNOW PLOWS

2 single, 1 double truck

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg. Philadelphia, Pa.

FOR SALE
Lorain 34-500-volt
ARMATURE,
newly rewound, good commutator and shaft. $100.

DOUBLEDAY-HILL ELECTRIC CO.
Pittsburgh, Pa.

FOR SALE
CARS
2—McKean Gaso-Electric Cars.
12—Differential 20-yd. Cars.
5—Gasoline Passenger Cars.
50—Freight Cars.
12—Electric Sets.

Get our Lists and Prices

J. F. DONAHOO CO. Birmingham, Ala.

CLEVELAND ARMATURE WORKS
Incorporated
Cleveland, Ohio

Everything in the Line of Repairs to Electrical Machinery

Complete Armatures, New Armatures, Rewound Armature Cores, Armature Shafts, Armature Coils, Fields and Commutators.

Established 22 Years

FOR SALE
MOTORS
10—Westinghouse 84 C individual, less gears, pinions and gear cases, but all bearings if desired. In good mechanical and electrical running order. Also 15 K 11 A controllers.

Good condition

Address W. H. SHAW, *Pur. Agt.*
Georgia Ry. & Power Co., Atlanta, Ga.

35 Tons
7-in. Girder Rails
P. S. Co. Section No. 238

HENRY LEVIS & CO.
Commercial Trust Bldg., Philadelphia, Pa.

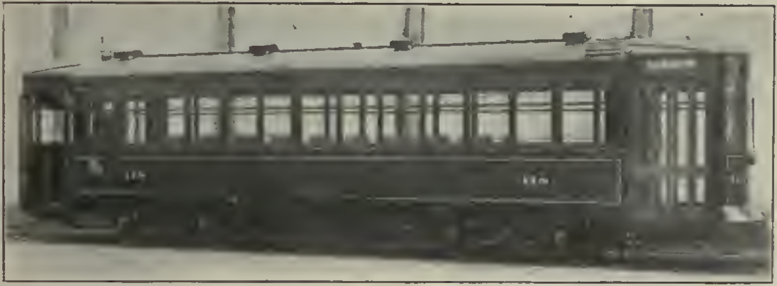
KERWIN RAIL GRINDER

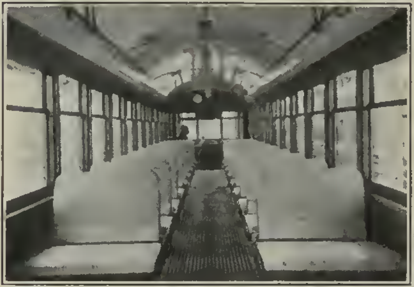
FOR SALE

Has seen very little service. Send your offer to

Wisconsin-Minnesota Light & Power Co.
Eau Claire, Wisconsin

United States Shipping Board Emergency Fleet Corporation





Bids—For the purchase, f.o.b. cars Philadelphia, of any number of cars up to and including six, will be received by J. W. Smith, Manager Passenger Transportation and Housing Division, United States Shipping Board Emergency Fleet Corporation, No. 140 North Broad Street, Philadelphia.

Delivery—Immediate.

Terms—25% sight draft. Balance to be arranged.

General—Cars and equipment are entirely new, are open to inspection on request at the works of the manufacturer, the J. G. Brill Company, and cost, as is, $13,570 each.

SPECIFICATIONS

BODY

Length over anti-climbers, 45 ft. 6 in.
Length over corner posts, 33 ft. 0 in.
Length over vestibules, 44 ft. 2 in.
Extreme width, 8 ft. 6 in.
Height from rail over trolley board, 11 ft. 8 in.
Truck centers, 21 ft. 0 in.
Radius of shortest curve, 35 ft.
Seating capacity, 50
Sheathing (sheet steel) 3/32 in.
Doors, Hand operated
Headlight, Crouse Hinds "Imperial"
Registers, International R-7
Fare Boxes, International G-15
Heater, 1—Peter Smith Hot Air
Hand Brakes, National

AIR EQUIPMENT

G.E. Straight-Air Compressor C.P.-27

TRUCKS

Brill 77 E-1 Wheel Base, 5 ft. 9 in.
Diameter of Wheel, 33 in.
Tread, 3 in.
Flange, ¾ x ⅞ in.
Axle in Motor Bearing, 4½ in.
Axle in Gear Seat, 5 in.
Gauge of Track, 4 ft. 8½ in.

MOTOR EQUIPMENT

4 Westinghouse 514 A-600 volt 40 H.P. Motors
Double end K-35 G-2 Control
Solid Gears—58 teeth Pinions—15 teeth

PERFORMANCE

The free running speed on tangent level track and 525 volts will be 30-31 m.p.h. with car carrying 50 passengers.

WEIGHT

Light, 42240 With 50 passengers, 49740

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Rectifiers
Holden & White, Inc.

Amusement Devices
Este Co., The J. D.

Anchors, Guy
Electric Service Supplies Co.
Holden & White, Inc.
Ohio Brass Co
Westinghouse Elec. & M. Co.

Ash Storage Tanks, Cast Iron
Green Engineering Co.

Automobiles and Buses
Brill Co., The J. G.

Axle Straighteners
Columbia M. W. & M. I. Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Cambria Steel Co.
Carnegie Steel Co.
National Railway Appliance Co.
St. Louis Car Co.
Standard Steel Works Co.
Westinghouse Elec. & M. Co.

Babbitting Devices
Columbia M. W. & M. I. Co.

Badges and Buttons
Electric Service Supplies Co.
International Register Co., The

Batteries, Dry
Nichols-Lintern Co.

Batteries, Storage
Electric Storage Battery Co.

Bearings and Bearing Metals
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
More-Jones Brass & Metal Co.
St. Louis Car Co.
Westinghouse Elec. & M. Co.

Bearings, Center and Roller Side
Holden & White, Inc.

Bearings, Oilless, Graphite & Bronze
Bound Brook Oilless Bearing Co.

Bearings, Roller and Ball
Gurney Ball-Bearing Co.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail
Niles-Bement-Pond Co.
Zelnicker, Walter A., Supply Co., Inc.

Boilers
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Cambria Steel Co.

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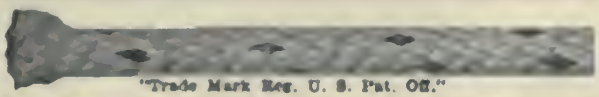

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